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Multidisciplinary Management Of Fragility Fractures

Treatment outcomes of teriparatide application in osteoporotic patients with pelvic fragility fractures

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The aim of this study was to evaluate clinical features and therapeutic effects of teriparatide (TPD) use in patients with pelvic fragility fractures (PFFs). During 2014-2016, 32 patients (26 women and 6 men) with PFFs were treated in our clinic and their medical records were checked retrospectively. They all suffered from osteoporosis. Their mean T-Score value in lumbar spine was -3.8 (-2.9 to -5.8). Fracture diagnosis was based on plain radiographs (PR) and computed tomography (CT) of the pelvis. Additional MRI and bone scintigraphy tests were needed in 4 and 8 cases, respectively. Patients were treated conservatively with bed rest and gradual mobilization within one month of injury (as tolerated), analgesics, vitamin D (25kIU p.o/week), and calcium (1000 mg p.o/day) supplements. In 14 cases, TPD (20 μg/day s.c.) was administered within two weeks of injury. Post-fracture patient follow-up was initially performed every 4 weeks for the first 6 months and every 3 months thereafter and was based on radiological (PR and/or CT) and clinical (Visual Analogue Scale of Pain/VAS) criteria. The mean patient age was 76.8 (69-83) years. PFFs were located: in the sacrum and the pubic rami together (6 patients), in the sacrum (12 patients), in the pubic rami (14 patients). In one case there was a fracture displacement and pain exacerbation at 4-week follow-up and performed percutaneous sacroiliac fixation with screws. The duration of fracture healing was significantly shorter in patients using TPD (P<0.05). The mean value of VAS was also lower in patients receiving TPD, however, there was no statistically significant difference with the others. In osteoporotic patients with pelvic pain and without major injury, we should always suspect the presence of PFFs. While conservative treatment has been shown to be adequate, it appears that TPD reduces time of fracture union and could be a favorable treatment option.

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Effect of bisphosphonate administration starting time on healing of osteoporotic intertrochanteric fractures

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Early use of bisphosphonates is thought to inhibit callus bone remodeling in cortical bone and delay fracture healing in patients with osteoporosis by inhibiting osteoclast function. For this reason, the optimal time to consider bisphosphonate (BP) therapy remains controversial. The purpose of this study was to investigate the effect of initial BP administration time on bone healing and to identify the best administration time after surgical treatment of osteoporotic intertrochanteric fractures (OIF). During the period 2006 and 2016, three hundred and four patients (304 hips: 102 men and 202 women) who underwent intramedullary nailing after OIF were analyzed retrospectively. Patients were divided into three groups according to the time of BP administration postoperatively (po): 1 week p.o. (group A: n=108), 1 month p.o. (group B: n=104) and 3 months p.o. (group C: n=92). Their clinical evaluation was based on preoperative Koval scores and change of Koval scores 1 year p.o. The determination of fracture union time was based on radiological (calluses of the bone along the fracture line in anteroposterior and lateral radiographs) and on clinical criteria (absence of pain during hip movement). The average follow-up period was 52.4 months. Koval scores one year p.o. for groups A, B, and C were 2.48, 2.40, and 2.47 respectively (*P*=0.887). The mean time of fracture union was 12.8, 12.3, and 12.7 weeks p.o. respectively (*P*=0.881). There were 1, 3 and 4 cases of fracture fixation displacement, respectively, but the distribution did not show a significant difference (P>0.480). There was no case of fracture non-union. Conclusively, the time of onset of BP administration after surgery does not affect clinical outcomes in patients with OIF.

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Effect of preoperative bisphosphonate administration on the healing of intertrochanteric femoral fractures after intramedullary nailing

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Bisphosphonates (BPs) are the most commonly used antiresorptive osteoporosis medications. However, there have been concerns about their negative effects on fracture healing as they may inhibit bone remodeling and delay fracture union due to osteoclast inhibition. The purpose of this study was to investigate the effects on fracture healing of BP administration before intramedullary nailing (IMN) of intertrochanteric femoral fractures (IFF). We retrospectively analyzed data from 350 patients who underwent IMN for osteoporotic IFF during the period between 2013 and 2018. Patients were divided into two groups (A and B). Group A (n=125) included those who had previously received BPs for at least 3 months prior to IMN. Group B (n=225) included all patients who had not received BPs. Evaluation of fracture healing outcomes in both groups was based on radiological (callus formation in plain radiographs 3, 6 and 12 months after IMN) and clinical (change in Koval score before and 1 year after IMN) criteria. Three, 6 and 12 months after IMN, fracture healing was achieved in 72.8% (91/125), 90.4% (113/125) and 92.8.6% (116/125) of patients, respectively, in group A and in 90.7% (204/225), 94.2 (212/225) and in 96.9% (218/225) of patients, respectively, in group B. The change in Koval score was of the order of 0.1 (from 1.2 before IMN to 1.1 one year after IMN; p=0.69). Multivariable logistic regression analysis revealed that a history of BP administration was associated with an increased risk of delayed union at 3 months postoperatively (P=0.016). Preoperative BP administration was associated with a reduced rate of fracture healing 3 months after IMN, compared with patients who had not received BPs. Therefore, patients who have previously been treated with BPs should leave walking aids with extreme caution and gradually and very carefully switch to full weight during the early postoperative period.

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Prevalence of swallowing impairments and comorbidities in hip/femur fractures admissions in the elderly: a prospective study

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Introduction: Swallowing impairments (SI)/dysphagia are a common well-documented symptom in the elderly[1]. Patients admitted to hospitals with fractures are likely to get diagnosed with SI. These symptoms are probably not typically associated with new onset dysphagia due to the main reason for admission, but much more with an already existing condition[2]. Little is known about the concurrent comorbidities that might lead to SI or changes in the nutritional status before, during and after hospitalization in this population. The aim of the study was to investigate which concurrent comorbidities are leading to changes in nutritional and swallowing severity of elderly patients with hip/femur fractures.

Materials & Methods: In this prospective cohort study over a 1-year period (01/2020-01/2021), 151 patients with hip/femur fractures consecutively admitted to the regional hospital (mean age 83.9±8 years, 76,8% female) were included. Regarding the outcome measures, all patients were submitted to assessment of their cognitive status using the Mini Mental State Examination (MMSE)[3], the nutritional profile of the patients - Mini Nutritional Assessment Scale (MNA)[4], the level of anxiety and depression - Hospital Anxiety and Depression Scale[5]. The different symptomatology of the patients was captured and grouped based on patients' comorbidities: respiratory, neuropsychiatric, neurological, heart dysfunction, gastrointestinal, metabolic, urological, oncology, musculoskeletal. For the assessment of the level of dysphagia severity, Dysphagia Severity Rating Scale (DSRS)[6] was used and for the oral intake, the Functional Oral intake scale (FOIS)[7]. Data regarding the hospital length of stay of the patients was also measured and presented in days. Non-parametric comparisons (Mann-Whitney) and correlations (Spearman's) were employed (SPSS 22.0).

Results: 151 patients were included and data was collected from their admission onwards (Table 1). 76.8% were female, the average age of the group was 83.9 years. More than half had a MMSE below 21 showing the presence of mild dementia and about 15% had more than 5 concurrent comorbidities. The most common were metabolic and heart diseases. 52.3% were at risk of malnutrition, 41% were malnourished, while only 6.5% of the patients had a normal nutritional status. Finally, almost 10% of the 151 patients had a FOIS lower than 5, while for 19 patients Fiberoptic Examination of Swallowing (FEES) was conducted as they exhibited overt symptoms of dysphagia.

Table 1. Demographics of the participants (N=151) at admission.

Demographics of participants (N=151) at admission		
Gender (%)		76,8% female
Age, average in years (SD)		83,9 (±8.6)
MMSE <21 (%)		53%
> 5 concurrent comorbidities (%)		15%
FOIS <5 (%)		9,9%
MNA	At risk of malnutrition(%)	52,3%
	Malnourished(%)	41,1%
19 patients – FEES (%)		12,6 %

Female (P=0.035) tend to present a lower level of functionality of oral intake (<5). Regarding the comorbidities, the patients with neuropsychiatric and respiratory diseases were found to have lower scores on FOIS scale and higher on DSRS scale, meaning that those two categories of patients showed more SI symptoms. On the other hand, the analysis revealed that patients with metabolic diseases had higher scores on FOIS scale (>6) and lower on DSRS, thus fewer swallowing impairments. A strong correlation was found between the eating status and age, as older patients have worse dysphagic symptoms. The patients with lower scores on FOIS scale had a tendency to stay longer in the hospital unit. A difference of about 10 days of staying in the Rehabilitation Center was observed for the patients that underwent a FEES examination, compared to the rest, mainly perhaps of verified dysphagia symptomatology. A strong association was found between the MNA results (nutritional status) and FOIS in the whole group. Lastly, on discharge, patients with swallowing impairments at admission as observed with FEES, showed significant improvement in dysphagia on FEES and FOIS and DSRS scores (P=0.001).

Conclusions: Our results showed higher age range, nutritional compromise and number of comorbidities in patients with SI admitted with hip/femur fracture. Around 10% had signs of SI and the presence of dysphagia increased length of stay in patients in our study. Nutritional and Dysphagia screening are crucial for the appropriate medical management to guide referrals to dysphagia specialists and speech and language pathologists.

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Preoperative clinical status of elderly people with fragility hip fracture

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Hip fractures are considered the most severe fragility fracture. They are associated with increased morbidity and mortality and have an adverse impact on the economy. The incidence of hip fractures is expected to be increased. In 2000, the number of hip fractures was recorded about 1.6 million worldwide and this number is estimated to be increased to 4.5-5.3 million by 2050 according to the International Osteoporosis Foundation[1,2].

In our study we included 91 patients with hip fracture that were admitted in our department. Their clinical status was recorded preoperatively using different clinical assessment tools for sarcopenia and frailty (Sarc-F, Prisma -7, Clinical Fagility Scale), nutrition (Mini Nutritional Assessment -MNA), mobility state (New Mobility Score), mental state (AMMT-S, AMT-4, 4-AT), health state (ASA score, Charlson Index Score), quality of life (EQ-5D) and mortality (Nottingham Hip Fracture score and Sernbo score). Complications were also recorded and all data were analyzed.

The mean age of the patients was 83 (±7) years. The mean Charlson Comorbidity Index was 5 (2-12) and 72.9% of the patients had a BMI >23 kg/m^2. 17.7% of the patients had at least one postoperative complication and the hospital mortality rate was 10%. A great number of patients (24.7%) manifested signs of delirium, while 43.2% of them revealed possible cognitive impairment. According to the MNA test, 8.3% of cases were under malnutrition and 24.4% had a risk of malnutrition. It was found that 50.6% of patients showed moderate fragility while 18.5% showed severe fragility. The Prisma-7 test revealed that 70.9% of patients have a high risk of vulnerability and 60% had sarcopenia. The preoperative condition of our patients outlined the need of multidisciplinary treatment during the period of hospitalization and also afterwards during the phase of rehabilitation and secondary prevention.

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Rehabilitation of Fragility Fractures

Fragility Fractures and Dementia: From prevention to rehabilitation

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Physical exercise for prevention of dementia

World Health Organization Guidelines[1]:
Physical exercise interventions
Exercise should be recommended to normal-minded adults to reduce the risk of mental impairment.
- Level of documentation: moderate
- Recommended: highly

Exercise should be recommended to adults with Mild Cognitive Impairment to reduce the risk of mental impairment.
- Level of documentation: low
- Recommended: under conditions

Fragility Fractures and Dementia

- The increase in the age limit observed in recent years, as a result of the improvement of medical care, has led to an increase in dementia fragility fractures.
- To this day, it has not been clarified whether dementia is the cause

of fragility fractures or whether there is a two-way relationship between the two conditions.
- What is certain, however, is that both of these conditions present significant morbidity and mortality in the elderly and together constitute a significant public health problem[2].

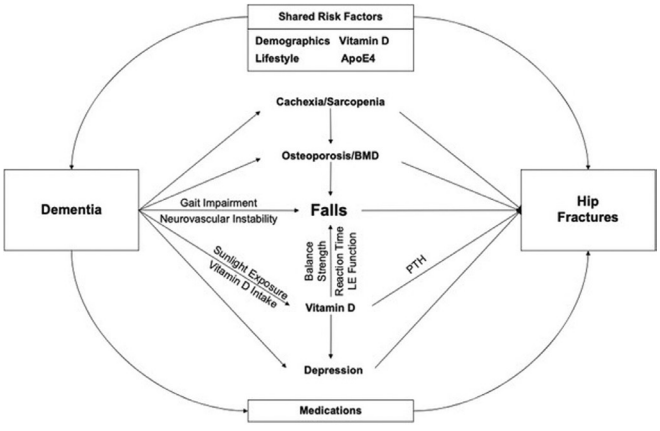
Falls in the elderly

- Falls in the elderly are a major public health problem, especially in terms of morbidity, mortality and treatment costs.
- 28-35% of people over the age of 65 experience at least one fall per year and this rate increases to 32-42% for people over the age of 75 (approximately 17 million Europeans).
- 40-60% of falls cause injuries to patients of which 30-50% are mild, 5-6% severe and 5% are fractures (1/5 are hip fractures).
- 50% of people over the age of 80 will experience at least one fall and this is three times more common in people who stay in rest homes for a long time[3].

Hip fractures in patients with dementia

The incidence of hip fractures in patients with dementia is up to three times higher than in older adults without dementia and there are many pathways involved in this increased risk.

Figure 1. Pathogenic framework for dementia and hip fractures. Several intermediate risk factors are interrelated, and this is described in the text. These connections are not depicted in the Figure for ease of reading. This framework depicts 3 mechanisms by which dementia increases hip fracture risk: (1) shared risk factors increase co-occurrence; (2) dementia increases the risk of multiple intermediate risk factors, which in turn, increase hip fracture risk; (3) treatment of dementia increases hip fracture risk[11].



The role of Physiotherapy in the treatment of fragility fractures

- Physiotherapists participate from the early stages of the disease by evaluating any restrictions on activities to the development and implementation of programs of personal needs.
- Patients with dementia who are at the highest risk of falling, need a comprehensive assessment of risk factors and especially of their physical condition, as well as actions to prevent falls and injuries that entail[4].

Rehabilitation

- Factors affecting the treatment of osteoporotic fractures in the elderly are bone quality, patient level of cooperation, stability of osteosynthesis and progressive postoperative mobilization.
- The rehabilitation team encourages early mobilization and self-service of the patient and prevents prolonged bed rest and dependence on third person[1,4].

Goals of Physiotherapy program

- Reduce the pain.
- Increase or maintain the range of movement, muscle strength, elasticity, coordination, balance and endurance.
- Improve the proprioception of joints.
- Improve the overall physical condition through therapeutic exercise programs.
- Suggest auxiliary agents to promote independence.
- Adjustments that make the living space accessible and safe[5].

Physiotherapy Rehabilitation

- Throughout the physiotherapy session, the patient should be placed correctly in bed for the correct execution of exercises.
- The kinesiotherapy program:
  - starts with basic torso exercises - activities (strengthening of dorsal muscles, modified abdominal exercises where applicable, pelvic floor exercises).
  - continues with the healthy joints and those adjacent to the operated area.
  - ends up with the planning of motion and strength exercises of the affected area[6].

Kinesiotherapy of the Operated Member

- It is performed from the distal to the closest joint, in relation to the surgery.
- If the patient has undergone hip surgery, kinesiotherapy starts with mobilization of the foot area, then the ankle, knee area and finally the hip area.

Kinesiotherapy of the Operated Member

Dynamic pump exercises of lower extremity should definitely be performed to avoid and prevent vascular complications.
- In addition, and at the discretion of the physiotherapist regarding the degree of difficulty of the program, the following are performed:
- Balance exercises from sitting position on the bed.
- Active mobilization of the non-operated member[7,8].

Kinesiotherapy of the Operated Member

- Continuous monitoring of the member's sensibility is considered necessary, at least until the postoperative inflammation and swelling subside.
- Depending on patient's progress, the program progressively integrates re-training exercises for proprioception and promotion of neuromuscular coordination[9].

Kinesiotherapy of the Operated Member

- Limitation of daily activity due to sarcopenia and loss of muscle strength can be improved through muscle retraining programs.
- Finally, the ultimate goal of the above Physiotherapy intervention program is to return the patient's functional independence and quality of life to pre-fracture levels of mobility, functionality and self-service[10].

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Secondary Prevention of Fragility Fractures

Fracture risk assessment in the Greek population via the FRAX algorithm | Nursing and Physical Therapy intervention in patients with osteoporosis

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Definition | Greek data

Given the unique characterization of the 'silent disease', osteoporosis stands as a chronic skeletal disorder, the principal trademark of which is the occurrence/manifestation of low-impact fractures.

The identified fractures are the result of the subsequent clinical factors:

- Significant decrease of the bone mineral density [BMD] and
- Alteration of the micro-architecture of the bone tissue[1]

In accordance with the data provided by the International Osteoporosis Foundation [IOF], 75 million individuals suffer from osteoporosis in Europe, USA and Japan, with the prevalence of the disease being much greater in female post-menopausal population. The recorded increase is also augmented due to the rise of life expectancy throughout the last decade.

With regards to the Greek population, what is being detected throughout a 15 years time period, is an upsurge of the hip fracture incidences on a scale of 7.6%[2].

The diagnostic tool FRAX | The Greek version of the algorithm

FRAX is an established diagnostic tool, which is used worldwide in order to evaluate the 10 year probability of bone fracture risk, regardless of the individual's gender. Being single out as easily accessible, FRAX is considered to be of substantial assistance for every clinical health-care practitioner.

Due to the unavailability of a Greek calibrated version of the FRAX algorithm, the Greek clinical doctors, encountered noteworthy obstacles when it came to the precise assessment of the 10 year fracture risk[3,4]. The year 2012, the Hellenic Osteoporosis Foundation [HELIOST], in cooperation with the University of Sheffield [U.K.] and the Hellenic National School of Public Health [NSPH], introduced the Greek version of the algorithm, which incorporated Greek epidemiologic data[5].

The contribution of nursing staff in osteoporosis

Nursing is a health profession which affects a wide range of age-groups, while being respectful to the associated health issue[6]. Beneficial yet constructive results can be achieved by the nursing stuff throughout the education of the individuals in the community. On the spotlight of these attempts, should be the individuals pictured as high-risk for the manifestation of osteoporosis. Since the identification of the high-fracture risk patient has been processed, the registered nurse being in consultation with the treating doctor, recommend as well assists the undergoing of a BMD scan. Lastly but not least, the nursing staff keeps an open eye for mistaken, misguided, irregular or abrupt disruption of the associated medication[7].

Figure 1. Graphical Illustration of the nursing intervention in osteoporosis [Retrieved from personal archive].

The physical therapy intervention in osteoporosis

In favor of retaining a successful intervention, physical therapists are requested to deliberately construct a therapeutic plan focusing on physical activity. This particular plan should be designated as personalized for each individual, taking in consideration several distinctive aspects such as:

- The maintenance of a lifestyle which encompasses physical activity
- Adjustment of daily-living aspects or even habits which affect the loss of bone density
- Preventing fall incidences that could induce low-energy factures
- Strengthening, stretching and maintaining the required properties of musculature

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Correlation of eating habits with musculoskeletal problems in elderly people

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Musculoskeletal problems are highly associated with aging, and often lead to reduced functionality and frailty. The existing research background has highlighted the association of diet with osteoporosis, osteoarthritis and sarcopenia, as well as the effect of certain foods on inflammation and pain. The aim of this study was to correlate eating habits with the occurrence of musculoskeletal problems in elderly people. The study was carried out with Convenience sampling from November 2020 to January 2021 in 100 community-dwelling people over 65 years. 2 questionnaires were used: the Nordic Musculoskeletal Questionnaires (NMQs) and b) the Food Frequency Questionnaire (FFQ). The confidence interval and error rate were set at 95% and 5% respectively.

42% of the participants were women, and the mean age was 73.8 years. The areas with a higher musculoskeletal pain were the knees (55%), the low back (46%), the hips (46%) and the neck (41%). In addition, 44% had problems in everyday life due to pain at the knees, 35% at the low back, 32% at the hips and 34% at the shoulder blade during the last 12 months. A statistically significant negative correlation was found between the consumption of foods with anti-inflammatory action (omega-3 fats, fiber and probiotics) and the existence of musculoskeletal problems [$r(100)= -0.34$, $p=0.05$]. A higher incidence of musculoskeletal problems was also found in men compared to women [$t(98)=2.99$, $p<0.05$]. The consumption of vegetables had a protective effect to musculoskeletal disorders, due to the high magnesium level. Finally, higher age was a significant risk factor of musculoskeletal disorders.

The results of the present study showed that an unhealthy diet may be a cause for the occurrence of musculoskeletal disorders in older people. Nutritional interventions are of major importance in order to increase the adherence of older people in health eating habits. Interventions can focus on nutrition education, in addition to simply providing nutritional plans so that older people can choose food that can help reduce the chronic musculoskeletal pain.

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Osteosarcopenia during quarantine: What have we learned from the COVID-19 pandemic?

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The COVID-19 pandemic has been and continues to be a challenging phenomenon for healthcare systems around the world, revealing several of their weaknesses. The implementation of lockdowns and quarantines was a key strategy to stop the spread of the pandemic, but without lack of consequences. The purpose of this study is to identify the factors that contributed to the occurrence of osteosarcopenia during the quarantine period, and to propose preventive measures. A literature search was conducted in PubMed using the following algorithm: ("sarcopenia" or "osteopenia" or "osteosarcopenia") and ("lockdown" or "containment" or "quarantine" or "pandemic" or "coronavirus" or "COVID*"). The publication date was set from 01/12/2019 to 31/03/2021. We found that factors such as reduced physical activity, sedentary lifestyle, unhealthy eating habits and reduced sun exposure, could predispose to osteosarcopenia. The impact of these factors is increased, when anxiety disorders, depression or lack of sleep are present. For prevention, a rehabilitative program, including aerobic, resistance, balance, coordination and mobility training exercises of 200 to 400 minutes, distributed among 5 to 7 days/week, is advised. A balanced diet with high-quality protein (meat, fish, dairy, eggs) also promotes muscle synthesis. The recommended protein intake amounts to 1.0 to 1.2 g/kg/day in healthy older adults. Measuring serum 25(OH)D levels and supplementing those whose levels are clearly below 10 ng/ml, with daily doses not exceeding 4000 IU should be a reasonably safe option. To summarize, lifestyle changes brought about by restrictive measures may lead to an increased incidence of osteosarcopenia, especially in the elderly. It is important to encourage people for adequate physical activity, healthy eating habits, and optimal regulation of comorbidities, so that possible new lockdowns or quarantines in the future could only have a positive contribution to the raging battle against COVID-19.

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Reducing the fear of falls of older people as a result of participating in an online prevention program

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Fear of falls can lead to significant limitations of activity and in the long run it can have a negative impact on physical and mental health or even increase the risk of falling. The aim of this study was to evaluate the effectiveness of an online exercise and education

program in reducing the fear of falls. A three-month intervention was conducted which included:

- Personalized exercise program, according to the functionality and the risk of falling of the participants. The exercise book was based on Vivifrail program.
- Weekly combined exercise and dance program, personalized diets and nutrition education. Both exercise and diet programs were self-evaluated by keeping a weekly diary.
- Education on fall-related topics, based on the "Do not fall for it. Falls can be prevented!". In order to enhance engagement, monthly projects were created in 3 thematic areas: personal risk factors, home safety, action plan in case of falling. Fear of falls was measured with the Falls Efficacy Scale - International (FES-I).

20 people (95% women, mean age 69 years) with a falls history or risk participated in the pilot implementation of this program. Fear of falls was reduced from the level of high anxiety (29<) to the level of moderate anxiety (values 20-27). The mean FES-I value of the initial measurement was 29.9 (SD±10.36) and the respective value after the intervention was 26.31 (SD±9.29). Wilcoxon non-parametric control showed that there was a statistically significant difference between the two measurements (p<,05) which shows that the multilevel online intervention was effective. The evaluation of the diaries showed high compliance with the exercise program, while there was low compliance with the dietary guidelines. In conclusion, this pilot study showed that the program had positive results, as it reduced the fear of falls. In addition, the implementation of the program highlighted the need to educate older people in digital skills, the positive impact of online programs on emotional health and the concern for reliable ways of intervention that will lead to higher compliance with healthier nutritional habits.

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Bone mineral density between the dominant and non-dominant forearms of adult handball players

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The aim of this study was to evaluate the potential difference in bone mineral density (BMD) between the dominant and non-dominant forearms of adult female handball players. Twelve adult female handball players (age mean 52 years) were recruited in order to measure the BMD of the dominant and non-dominant forearm and fifteen adult females (age mean 54 years) from the general population to serve as the control group. The dual-energy X-ray absorptiometry (DEXA) was utilized for this purpose. BMD was significantly higher in the dominant forearm of handball players (T-score: -1.1) compared to the non-dominant one (T-score: -1,8), (p<0.05). No significant differences were found in the control group. This study indicates that specific exercise could play a promising role in the prevention of osteoporosis.

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Is type 2 diabetes mellitus a risk factor for fragility hip fractures?

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Current evidence supports that individuals with diabetes mellitus type 2 (T2DM) are more vulnerable to fragility fractures, although elderly patients with osteoporotic and especially hip fractures haven't receive the appropriate proportion of the publishing data. We retrospectively studied elderly patients (>60 years old) with low energy hip fractures, which were treated in our department during the last year between January 2020 and January 2021 to determine if T2DM consists a worth-noting risk factor for fragility hip fractures in this specific age group. Furthermore, we conducted a systematic review of the literature concerning elderly with fragility fractures (especially hip fractures) and the possible impact of T2DM. We retrieved 141 patients over 65 years old with fragility hip fractures from our department, 73 with extracapsular and 68 intra-capsular, while mean age was 73.66. Among them we found 41 patients with T2DM, so a total 29,07% of the elderly with fragility hip fracture were also diabetic. This finding confirms the fact that diabetic elderly individuals are at increased risk for hip fractures. The results from our systematic review concludes that there is almost consensus about the increased prevalence of all kinds of fragility fractures and especially low-energy hip fractures among elderly patients with T2DM compared with their counterparts without T2DM, while there is relative controversy concerning the non-vertebral fractures. Insulin usage can even double the risk for fragility fracture. Bone fragility should be recognized as a new complication of T2DM, especially in elderly patients. The elderly patients are even more vulnerable to T2DM-induced bone fragility due to several additional aggravating factors, which include senile osteoporosis, severe vitamin D deficiency, presence of many comorbidities, increased possibility of insulin usage, presence of diabetes-related complications and especially diabetic neuropathy and retinopathy, predisposing to falls.

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Implications of deficient vitamin D levels in diabetic elderly

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The last two decades there has been expanding evidence describing the implications of vitamin D deficiency (VDD) in patients with type 2 diabetes mellitus (T2DM), although until now elderly haven't received the required proportion of the published studies. PubMed and Google Scholar were searched for relevant articles published up to October 2020. The keywords used were: VDD, elderly and diabetes mellitus type 2. Among 556 articles retrieved, 90 full texts were eligible and only 34 studies met the inclusion criteria for the review. According to this study there is adequate evidence to support the correlation between VDD and T2DM in elderly. Results from RCTs are more conflicting, so further studies are necessary to confirm the impact of VDD supplementation on metabolic, lipid profile, oxidative stress and complications of T2DM in elderly. VDD is clearly related with severe retinopathy, diabetic peripheral neuropathy and poor cognition performance, while there is consensus about the beneficial effect of vitamin D (VD) on peripheral artery disease, foot ulceration prevention and wound healing. There is controversy about the effect of VD supplementation on cardiovascular adverse events, endothelial function and estimated glomerular filtration rate (eGFR). The association of VDD with fragility fractures and depression in the elderly with T2DM is currently insufficiently studied and remains controversial. Undoubtedly, there is definite correlation of VDD with T2DM in elderly. The effect of VD supplementation on metabolic and lipid profile, oxidative stress and complications of T2DM in older patients require larger randomized controlled trials. Definition of the exact threshold of VD levels and the regimen of VD supplementation is important, although very difficult to be determined. Based on the small number of studies and the conflicting results in specific points of this topic, there is emerging need for new well-designed studies for elderly with T2DM and VDD.

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Physical activity as a reducing factor of fear of falling in elderly

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Fall-related fractures, especially in the elderly, have a negative impact on quality of life and are associated with disability and mortality risk[1]. Lack of self-confidence, and consequently, fear of falling (FoF) can lead to reduced physical function and social interaction[2]. The purpose of this review is to investigate whether physical activity can positively affect FoF experienced by the elderly after fragility fractures. PubMed was searched for studies assessing physical activity interventions in trials addressing people aged over 65 years. The aforementioned studies reported data on strength, balance, mobility and their impact on FoF. We included studies published until 2021 in English and conducted a qualitative synthesis of results. A total of 48 trials included. Most of the studies showed that physical activity improved balance and mobility, increased strength, and reduced the risk of falls in the elderly having experienced fragility fractures[3-5]. Physical activity, including balance training, strengthening exercises and flexibility, seems to be an effective intervention in improving balance control, reducing FoF and thus reducing falls in the elderly over 65 years of age.

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Ergonomic shoe safety improvement in reducing falls in ambulatory frail older adults

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Crucial factors that highlight the ergonomic applicability in the reduction of falls are the home environment and shoes. Walking barefoot is associated with changes in the parameters of proprioception, balance, gait and mobility. Furthermore clubfoot, flatfeet, hallux valgus, Morton's neuroma, tarsal tunnel syndrome, diabetic peripheral neuropathy (DPN) and plantar fasciitis are pathologies affecting feet function. Our research group work aims to review the literature, concerning the factors of home safety with an approach to the ergonomic component, regarding the reduction of falls in ambulatory frail elderly and the preliminary use of the Footwear

Assessment Tool. An exploratory assessment was conducted on the footwear of 3 older people, using the Footwear Assessment Tool. The measurements consist of six different subcategories, which determine the suitability of the shoe. The sample consisted of 3 pairs of shoes from each one of the 3 older people (9 in total). It was found that the ergonomic design of the home environment and the footwear constitutes an important issue in reducing the incidents of falls, as well as in the treatment and prevention of common foot disorders. According to the evaluation of the sample shoes with the Footwear Assessment Tool, 6 of them were less likely to cause a fall, whereas 3 of them had a higher chance to cause one, without any of them having entirely the most ideal or the least ideal features. To sum up, an important ergonomic factor in the prevention of falls is footwear. Defining the ideal shoe is not an easy task to achieve, as it has to combine several factors to be safe and appealing to wear. It is concluded that there is an urgency for further research, regarding the assessment of shoe factors and their association to falls.

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