

Pharmacist-Nutritionist Collaboration in Optimizing Vitamin D Supplementation in Osteoporotic Patients

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Abstract

Osteoporosis is a common metabolic bone disorder characterized by reduced bone mass and increased fracture risk. This study aimed to evaluate the impact of collaborative care between pharmacists and clinical nutritionists on vitamin D optimization and related outcomes in osteoporotic patients at a tertiary hospital. A retrospective analysis of 150 patient records was conducted, comparing conventional care with an intervention group receiving collaborative care. Findings indicated that patients receiving collaborative care showed significantly greater improvements in serum 25(OH)D levels, adherence to supplementation, bone mineral density, and a reduction in fracture incidence compared to the control group. These results underscore the value of a multidisciplinary approach in optimizing vitamin D supplementation and improving bone health outcomes in osteoporotic patients.

Keywords: Osteoporosis, Vitamin D, Pharmacist, Clinical Nutritionist, Collaborative Care, Bone Mineral Density, Fracture Risk

Introduction

Osteoporosis is a prevalent metabolic bone disorder characterized by decreased bone mass and deterioration of bone tissue, leading to increased bone fragility and susceptibility to fractures (Rachner et al., 2011). Effective management of osteoporosis often involves pharmacological treatment alongside nutritional interventions to improve bone mineral density and reduce fracture risk (Cosman et al., 2014). One of the most crucial components in the prevention and treatment of osteoporosis is adequate vitamin D supplementation, which plays a pivotal role in calcium absorption, bone mineralization, and overall skeletal health (Holick, 2010).

Vitamin D deficiency is common among osteoporotic patients, particularly the elderly population, due to limited sun exposure, reduced skin synthesis, and dietary insufficiencies (Holick, 2010). The consequences of vitamin D deficiency include impaired calcium homeostasis, secondary hyperparathyroidism, and increased bone turnover, all of which contribute to bone fragility (Bouillon et al., 2019). Therefore, optimal vitamin D supplementation is a critical component of osteoporosis management, especially in elderly and high-risk individuals.

Collaboration between pharmacists and clinical nutritionists has the potential to improve the effectiveness of vitamin D supplementation in osteoporotic patients. Pharmacists play an essential role in assessing and managing patients' medication regimens, ensuring adherence, and minimizing potential drug-nutrient interactions. Meanwhile, clinical nutritionists provide dietary assessments and individualized nutrition plans to address nutrient gaps, including vitamin D (Grindrod et al., 2006). By working together, pharmacists and nutritionists can provide a comprehensive and patient-centered approach to optimize vitamin D status, enhance bone health, and ultimately reduce the risk of fractures in osteoporotic patients.

This paper aims to explore the role of collaborative efforts between pharmacists and clinical nutritionists in optimizing vitamin D supplementation among osteoporotic patients, assessing the impact of such an integrated approach on patient outcomes.

Literature Review

The management of osteoporosis requires a multifaceted approach that includes pharmacological treatment, lifestyle modifications, and nutritional interventions. Vitamin D supplementation is critical for optimizing bone health, as it enhances calcium absorption and helps in maintaining bone mineral density (Holick, 2010). Numerous studies have highlighted the importance of vitamin D in osteoporosis management, particularly in elderly populations who are at greater risk of deficiency due to factors such as limited sun exposure and reduced dietary intake (Bouillon et al., 2019; Holick, 2010).

Research has demonstrated that vitamin D deficiency is associated with an increased risk of fractures, impaired bone mineralization, and secondary hyperparathyroidism (Bouillon et al., 2019). A meta-analysis by Bischoff-Ferrari et al. (2009) concluded that vitamin D supplementation significantly reduces the risk of falls and fractures in older adults, further underscoring the importance of maintaining adequate vitamin D levels in osteoporotic patients. However, achieving optimal vitamin D status requires not only supplementation but also careful management of individual patient needs, which may benefit from a multidisciplinary approach involving both pharmacists and clinical nutritionists.

Pharmacists play a key role in ensuring that patients adhere to their vitamin D supplementation regimens and in managing potential drug-nutrient interactions (Grindrod et al., 2006). Studies have shown that pharmacist-led interventions can improve medication adherence and optimize treatment outcomes in patients with chronic conditions, including osteoporosis (Fikri-Benbrahim et al., 2013). By conducting medication reviews and educating patients on the importance of vitamin D, pharmacists can help address common barriers to adherence, such as forgetfulness and misconceptions about supplementation.

Clinical nutritionists, on the other hand, provide essential support by assessing dietary intake and identifying potential nutritional deficiencies. They develop individualized nutrition plans that ensure patients receive adequate amounts of vitamin D through both diet and supplementation (Rizzoli, 2008). Nutritionists are also instrumental in educating patients about the dietary sources of vitamin D and the role of lifestyle factors, such as sun exposure, in maintaining adequate vitamin D levels.

The collaboration between pharmacists and nutritionists has been shown to be effective in improving patient outcomes in various clinical settings. A study by Grindrod et al. (2006) highlighted the benefits of pharmacist-nutritionist collaboration in managing osteoporosis, emphasizing that such an approach allows for comprehensive patient care that addresses both pharmacological and nutritional needs. This integrated

approach ensures that patients receive appropriate supplementation while minimizing the risk of drug-nutrient interactions and optimizing overall treatment adherence.

Furthermore, a study by Bowers et al. (2018) found that a multidisciplinary team approach, including pharmacists and nutritionists, led to significant improvements in bone health markers and reduced fracture risk among osteoporotic patients. The authors concluded that collaboration between healthcare professionals is essential for addressing the complex needs of osteoporotic patients, particularly in managing vitamin D deficiency and optimizing bone health.

In summary, the literature supports the idea that collaboration between pharmacists and clinical nutritionists can enhance the management of vitamin D supplementation in osteoporotic patients. By combining their expertise, these healthcare professionals can provide a holistic approach to patient care that improves adherence to supplementation, optimizes nutritional intake, and ultimately reduces the risk of fractures. The current study aims to build on this evidence by exploring the impact of pharmacist-nutritionist collaboration on vitamin D optimization and patient outcomes in osteoporosis management.

Methodology

This study was conducted at a tertiary hospital and involved a retrospective analysis of patient records to evaluate the impact of pharmacist-nutritionist collaboration on vitamin D optimization in osteoporotic patients. The study focused on patients diagnosed with osteoporosis who received treatment between January 2019 and December 2019. Ethical approval was obtained from the ethics committee prior to data collection.

Study Population

The study included adult patients (aged 50 years and older) diagnosed with osteoporosis who had been prescribed vitamin D supplementation as part of their treatment plan. Patients were excluded if they had chronic kidney disease, liver disease, or other conditions that could affect vitamin D metabolism. A total of 150 patient records were reviewed, with 75 patients receiving conventional care (control group) and 75 patients receiving collaborative care from pharmacists and nutritionists (intervention group).

Intervention

The intervention group received collaborative care involving both pharmacists and clinical nutritionists. Pharmacists conducted medication reviews, assessed adherence to vitamin D supplementation, and provided patient counseling on medication use and potential drug-nutrient interactions. Clinical nutritionists assessed dietary intake, identified potential nutritional deficiencies, and developed individualized nutrition plans to optimize vitamin D intake through diet and supplementation. Patients in the intervention group received follow-up consultations with both healthcare professionals throughout their treatment period.

Data Collection

Data were collected from electronic medical records, including patient demographics, vitamin D levels (measured through serum 25-hydroxyvitamin D [25(OH)D] concentrations), adherence to supplementation,

dietary assessments, and bone health markers such as bone mineral density (BMD) and fracture incidence. Data were collected at baseline (prior to the intervention) and at 6-month and 12-month follow-up points.

Outcome Measures

The primary outcome measure was the change in serum 25(OH)D levels from baseline to 12 months. Secondary outcomes included adherence to vitamin D supplementation, changes in BMD (measured via dual-energy X-ray absorptiometry [DXA]), and the incidence of fractures during the study period. Patient adherence was assessed through pharmacy refill records and patient self-reports.

Data Analysis

Descriptive statistics were used to summarize patient characteristics. Independent t-tests and chi-square tests were used to compare baseline characteristics between the control and intervention groups. Changes in serum 25(OH)D levels, BMD, and adherence rates were analyzed using repeated-measures ANOVA to assess the effect of the intervention over time. The incidence of fractures was compared between groups using Kaplan-Meier survival analysis.

Findings

The findings from the study are summarized in the tables below:

Outcome Measure	Control Group (n=75)	Intervention Group (n=75)	p-value
Serum 25(OH)D Levels (ng/mL)	Baseline: 18.5 ± 3.2	Baseline: 18.7 ± 3.0	0.72
	12 Months: 22.1 ± 4.5	12 Months: 31.6 ± 5.3	< 0.05

Outcome Measure	Control Group (n=75)	Intervention Group (n=75)	p-value
Adherence to Supplementation	68%	89%	< 0.05
Bone Mineral Density (BMD)	+1.2%	+4.8%	< 0.05
Fracture Incidence	15 patients (20%)	5 patients (6.7%)	< 0.05

The findings indicated that patients receiving collaborative care from pharmacists and clinical nutritionists demonstrated significantly greater improvements in serum 25(OH)D levels at 12 months compared to those receiving conventional care ($p < 0.05$). Adherence to vitamin D supplementation was also significantly higher in the intervention group (89%) compared to the control group (68%). Improvements in bone mineral density were more pronounced in the intervention group, with a mean increase of 4.8%, compared to a 1.2% increase in the control group ($p < 0.05$). Additionally, the incidence of fractures was lower in the intervention group, with only 6.7% of patients experiencing fractures compared to 20% in the control group ($p < 0.05$).

These results support the hypothesis that a collaborative approach involving both pharmacists and clinical nutritionists can optimize vitamin D supplementation, improve bone health markers, and reduce the risk of fractures in osteoporotic patients.

Discussion

The findings of this study underscore the importance of a multidisciplinary approach to managing osteoporosis, specifically through the collaboration between pharmacists and clinical nutritionists. The intervention group, which received collaborative care, demonstrated significant improvements in serum 25(OH)D levels, adherence to supplementation, bone mineral density, and a reduction in fracture incidence compared to the control group. These results are consistent with previous research that highlights the value of integrating pharmacological and nutritional interventions for osteoporosis management (Bowers et al., 2018; Grindrod et al., 2006).

One key finding was the substantial improvement in serum 25(OH)D levels among patients in the intervention group. This improvement is likely attributed to the combined efforts of pharmacists and nutritionists in optimizing supplementation and addressing dietary gaps. Pharmacists played a critical role in ensuring medication adherence and minimizing potential drug-nutrient interactions, while nutritionists provided tailored dietary plans and counseling. This synergistic approach ensured that patients not only received adequate supplementation but also made necessary lifestyle and dietary adjustments to enhance vitamin D status.

Adherence to vitamin D supplementation was significantly higher in the intervention group compared to the control group. This finding suggests that collaborative care involving both pharmacists and nutritionists can effectively address barriers to adherence, such as forgetfulness or misconceptions about supplementation. Pharmacists' counseling sessions, combined with nutritionists' dietary guidance, provided patients with comprehensive support, which likely contributed to improved adherence rates. This aligns with previous studies that have demonstrated the positive impact of pharmacist-led interventions on medication adherence (Fikri-Benbrahim et al., 2013).

Bone mineral density (BMD) also showed significant improvement in the intervention group. The mean increase in BMD was 4.8% in the intervention group compared to 1.2% in the control group. The greater improvement in BMD can be attributed to the optimized vitamin D supplementation and nutritional support provided by the collaborative care model. Adequate vitamin D levels are essential for calcium absorption and bone health, and the collaborative approach ensured that patients received both pharmacological and nutritional support to achieve optimal outcomes. This finding is in line with the literature, which emphasizes the importance of vitamin D in maintaining bone health and reducing fracture risk (Holick, 2010; Bouillon et al., 2019).

The incidence of fractures was significantly lower in the intervention group, with only 6.7% of patients experiencing fractures compared to 20% in the control group. This reduction in fracture incidence highlights the effectiveness of the multidisciplinary approach in reducing the risk of osteoporotic fractures. The collaborative efforts of pharmacists and nutritionists not only improved vitamin D status and BMD but also contributed to a reduction in fall-related fractures, which is a major concern for osteoporotic patients. The findings align with previous research that supports the role of vitamin D supplementation in reducing fracture risk in older adults (Bischoff-Ferrari et al., 2009).

The results of this study have important implications for clinical practice. The findings suggest that integrating pharmacists and nutritionists into the care team for osteoporotic patients can lead to significant improvements in patient outcomes. By working together, these healthcare professionals can provide a more

holistic approach to osteoporosis management, addressing both pharmacological and nutritional needs. This collaborative model could be implemented in other healthcare settings to improve the management of osteoporosis and potentially other chronic conditions that require multidisciplinary care.

However, this study has some limitations. The retrospective design may introduce selection bias, and the sample size was limited to a single tertiary hospital, which may affect the generalizability of the findings. Future studies should consider a prospective design with a larger sample size and multiple healthcare settings to validate the findings. Additionally, patient-reported outcomes, such as quality of life and satisfaction with care, were not assessed in this study. Including these outcomes in future research could provide a more comprehensive understanding of the impact of collaborative care on osteoporotic patients.

In conclusion, the findings of this study demonstrate that a collaborative approach involving pharmacists and clinical nutritionists can significantly improve vitamin D optimization, adherence to supplementation, bone mineral density, and reduce the risk of fractures in osteoporotic patients. These results highlight the value of a multidisciplinary approach to osteoporosis management and support the integration of pharmacists and nutritionists into the care team to enhance patient outcomes.

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ملخص

هشاشة العظام هي اضطراب شائع في العظام الأيضية يتميز بانخفاض كتلة العظام وزيادة خطر الكسر. هدفت هذه الدراسة إلى تقييم تأثير الرعاية التعاونية بين الصيدلة وخبراء التغذية السريرية على تحسين فيتامين د والنتائج ذات الصلة في مرضى هشاشة العظام في مستشفى ثالثي. تم إجراء تحليل بأثر رجعي لسجلات 150 مريضاً، ومقارنة الرعاية التقليدية بمجموعة تدخل تتلقى رعاية تعاونية. أشارت النتائج إلى في المصل، والالتزام بالمكملات، وكثافة (OH) D أن المرضى الذين يتلقون رعاية تعاونية أظهروا تحسناً أكبر بكثير في مستويات 25 المعادن في العظام، وانخفاض في حدوث الكسور مقارنة بمجموعة التحكم. تؤكد هذه النتائج على قيمة النهج متعدد التخصصات في تحسين مكملات فيتامين د وتحسين نتائج صحة العظام لدى مرضى هشاشة العظام.

الكلمات الرئيسية: هشاشة العظام، فيتامين د، صيدلي، أخصائي تغذية سريرية، رعاية تعاونية، كثافة المعادن في العظام، خطر الكسر