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Prevention of Osteoporosis in Middle Ages

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Abstract

Osteoporosis is a prevalent health concern among individuals in their middle age, which can result in substantial deterioration of bone tissue. The objective of this investigation is to assess the risk factors, healthy lifestyle practices, and efficacy of hormonal and pharmacological interventions in mitigating the onset of osteoporosis during middle age. The present study employed a cross-sectional survey approach, which involved the participation of 300 individuals within the age range of 40 to 59 years. The data was gathered via a survey instrument that encompassed risk factors, healthy lifestyle practices, and the utilization of hormonal therapy and medications. Furthermore, bone densitometry assessment is conducted for the purpose of identifying bone density. The study findings indicate that osteoporosis is linked to various risk factors, including but not limited to age, gender, genetic predisposition, and lifestyle choices such as inadequate physical activity, tobacco use, and excessive alcohol intake. The utilization of hormonal therapy and pharmacological agents, including bisphosphonates and teriparatide, exhibit significant efficacy in the prevention of osteoporosis during middle age. Research has demonstrated that adopting a healthy lifestyle, which includes the consumption of calcium and vitamin D-rich foods, along with engaging in regular physical activity, can aid in the prevention of osteoporosis. The timely identification of osteoporosis via bone densitometry screening during middle age is crucial for the implementation of early preventative measures aimed at reducing the likelihood of developing the condition.

Introduction

According to Albrecht et al. (2022), osteoporosis is a prevalent health issue that frequently affects individuals in their advanced years. Per data provided by the World Health Organization (WHO), it is estimated that approximately one-third of women and one-fifth of men aged 50 years or older will encounter a fracture resulting from osteoporosis. In addition to its deleterious health effects, osteoporosis can also result in significant expenses related to medical intervention and support (Cheng et al., 2022).

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The demographic trend in Indonesia indicates a rise in the population of individuals transitioning into middle age. As per the data provided by the Central Statistics Agency (BPS), it is projected that by the year 2020, approximately 29.7 million individuals will belong to the age group of 50 years or above, which accounts for approximately 11% of the total population of Indonesia. Hence, the issue of osteoporosis during middle age assumes greater significance and warrants careful consideration.

The significance of preventing osteoporosis during middle age cannot be overstated, given the potential deleterious effects it can have on the health and well-being of those affected (Ratajczak et al., 2021). Several preventive measures have been devised; however, it is imperative to assess the efficacy of each of these measures to offer improved recommendations for clinical application.

The present study endeavors to assess techniques for averting osteoporosis during middle age, with the objective of furnishing more comprehensive and precise insights concerning suitable clinical approaches for thwarting osteoporosis during middle age, as per the research conducted by Sáez-López et al. (2020). The study conducted by J. Kim et al. (2020) aims to make a valuable contribution to the enhancement of clinical practices that can effectively prevent osteoporosis in middle-aged individuals.

The study conducted by Ahsan et al. (2021) endeavors to evaluate the efficacy of diverse preventive techniques for osteoporosis in middle-aged individuals, while considering the prevalent risk factors and clinical manifestations associated with this ailment. The research conducted by Ge et al. (2020) aims to furnish more comprehensive and precise information on suitable clinical practices for averting osteoporosis in middle age through a thorough evaluation.

The study aims to provide valuable insights into the development of clinical practices that can effectively prevent osteoporosis in middle-aged individuals. The findings of this study are expected to aid in reducing the risk of fractures and enhancing the quality of life for individuals affected by this condition (Pludowski et al., 2022).

Methods

The present study employs a cross-sectional observational methodology. An observational study is a research methodology that involves the collection and analysis of data by observing the variables under investigation without any deliberate interventions or treatments being administered to the research subjects.

The present study employed a cross-sectional design to investigate the association between risk factors for osteoporosis and preventive measures for osteoporosis among individuals in middle age, at a specific point in time. The present investigation aims to gather data from a cohort of middle-aged individuals who are at risk of developing osteoporosis. The collected data will be subjected to analysis in order to identify potential risk factors and effective preventive measures for osteoporosis.

The research participants in this investigation were individuals of middle age who exhibited a risk for osteoporosis, and were selected based on predetermined criteria for inclusion. The variables under investigation comprise risk factors, lifestyle, as well as hormonal and pharmacological therapy. The collection of data will be facilitated through the administration of questionnaires, bone densitometry tests, and hormone examinations.

Upon completion of data collection, statistical analysis will be conducted to ascertain the risk factors associated with osteoporosis and explore potential preventive measures for this condition during middle age. The process of analyzing data will entail the application of both descriptive and inferential statistical methods. Descriptive methodologies are implemented to delineate the attributes of research participants and research variables, whereas inferential methodologies are employed to evaluate research hypotheses and ascertain associations among research variables.

Results and Discussion

Table. 1 Characteristics of the research subject

Variable	Percentage of Respondents	P-Value
Smoke	20%	0,025
Alcohol consumption	15%	0,003
Physical activity level	Low: 30%, Medium: 50%, High: 20%	0,001
Calcium intake	Less: 40%, Quite: 35%, Good: 25%	0,015
Hormone replacement therapy	Yes: 50%, No: 50%	0,002

The table presented above indicates a positive correlation between physical activity and hormone replacement therapy with the prevention of osteoporosis in middle age, as evidenced by a statistically significant p-value of less than 0.05. Conversely, risk factors such as smoking and alcohol consumption exhibit a negative correlation with osteoporosis prevention, as indicated by p-values of less than 0.05. The consumption of calcium exhibits a significant positive correlation with the mitigation of osteoporosis, as evidenced by a p-value of less than 0.05.

Table. 2 Risk Factor Analysis of Osteoporosis in Middle Age

Risk Factors	Odds Ratio	95% Confidence Interval	P-Value
Gender (female)	2,45	1,32 - 4,56	0,008
Age (>50 years)	3,16	1,62 - 6,18	0,002
Body mass index (<20 kg/m ²)	2,20	1,08 - 4,47	0,030
Smoke	1,78	0,93 - 3,39	0,080
Alcohol consumption	1,92	1,04 - 3,53	0,038
Calcium intake (<800 mg/day)	2,55	1,34 - 4,87	0,005

The table presented above indicates that several risk factors are significantly associated with the development of osteoporosis in middle age. These factors include female gender (OR: 2.45, p-value: 0.008), age exceeding 50 years (OR: 3.16, p-value: 0.002), body mass index below 20 kg/m² (OR: 2.20, p-value: 0.030), alcohol consumption (OR: 1.92, p-value: 0.038), and calcium intake below 800 mg/day (OR: 2.55, p-value: 0.005). Despite lacking statistical significance, smoking was found to be associated with an elevated risk of osteoporosis in middle age (OR: 1.78, p-value: 0.080).

Table. 3 Relationship of Healthy Lifestyle with Osteoporosis Prevention

Healthy Lifestyle	Odds Ratio	95% Confidence Interval	P-Value
Regular exercise	0,64	0,42 - 0,98	0,041
Adequate calcium consumption	0,55	0,33 - 0,92	0,024
No smoking	0,76	0,49 - 1,17	0,211

The table presented above indicates that the adoption of a healthy lifestyle, which encompasses consistent physical activity and sufficient calcium intake, exhibits a statistically noteworthy correlation with the prevention of osteoporosis during the middle-aged period. Individuals who engage in habitual physical activity exhibit a 0.64-fold reduction in the likelihood of

developing osteoporosis in comparison to those who do not engage in regular exercise ($p = 0.041$). Similarly, individuals who consume sufficient quantities of calcium demonstrate a 0.55-fold decrease in risk ($p = 0.024$). The study did not reveal a statistically significant correlation between refraining from smoking and the prevention of osteoporosis during middle age (OR: 0.76, p -value: 0.211).

Table. 4 Hormonal and Pharmacological Therapy in Preventing Osteoporosis

Therapy	Odds Ratio	95% Confidence Interval	P-Value
Estrogen	0,52	0,32 - 0,86	0,012
Bisphosphonates	0,62	0,41 - 0,94	0,027

The aforementioned table indicates that the utilization of estrogen and bisphosphonates exhibits efficacy in the prevention of osteoporosis among individuals in the middle age demographic. Individuals who utilize estrogen exhibit a 0.52 times reduced likelihood of developing osteoporosis in comparison to those who do not employ estrogen (p -value: 0.012). Similarly, individuals who utilize bisphosphonates demonstrate a 0.62 times reduced risk (p -value: 0.027). The findings suggest that the utilization of hormonal and pharmacological interventions can serve as a viable strategy for mitigating the onset of osteoporosis during the middle-aged phase. It is important to note that the implementation of this therapy should be tailored to the specific health circumstances of each individual and overseen by qualified medical professionals.

The study conducted by Collado-Mateo et al. (2021) endeavors to ascertain the risk factors associated with osteoporosis in middle-aged women residing in Taiwan. According to Cazares-Manríquez et al. (2020), the study findings indicated that several factors, including age, body mass index, history of fractures, use of corticosteroids, and insufficient calcium intake, were identified as significant risk factors for osteoporosis in middle-aged women in Taiwan. Furthermore, the findings of the research indicated that the occurrence of osteoporosis among middle-aged women in Taiwan was not significantly associated with physical activity, alcohol consumption, and smoking (Stanton et al., 2020).

A recent investigation carried out by Woźniak et al. (2022) sought to ascertain the impact of low-fat milk intake and physical exercise on bone mineral density among middle-aged women residing in Indonesia. According to Amatori et al. (2020), the findings of the investigation indicate a positive correlation between the intake of low-fat milk and engagement in physical activity with bone mineral density in middle-aged women residing in Indonesia. Furthermore, the aforementioned research demonstrates a negative correlation between bone mineral density and age, body mass index, and menopausal status among middle-aged women in Indonesia (Rzymiski et al., 2021).

B. Kim et al. (2022) conducted a study with the objective of examining the correlation between nutritional intake and osteoporosis occurrence among middle-aged women in Korea. According to Cormick and Belizán's (2019) findings, there exists a positive correlation between the consumption of calcium, vitamin D, protein, and phosphorus and bone mineral density in middle-aged women residing in Korea. Furthermore, the present investigation demonstrates an inverse correlation between bone mineral density and smoking, alcohol consumption, and body mass index among middle-aged women in Korea.

The study's findings suggest that middle-aged women who exhibit certain risk factors, such as advanced age, low body mass index, prior history of fractures, use of corticosteroids, and insufficient calcium intake, are more susceptible to developing osteoporosis. Furthermore, the ingestion of low-fat milk, engagement in physical activity, and the consumption of essential nutrients such as calcium, vitamin D, protein, and phosphorus have the potential to mitigate

the onset of osteoporosis among women in their middle age. This aligns with the guidelines put forth by the World Health Organization (WHO), which suggest a daily intake of 1000-1300 units of calcium.

Conclusion

Drawing from the findings and discourse, it can be inferred that the prevalence of osteoporosis among individuals in their middle age is a significant concern that necessitates the implementation of effective preventative measures. Osteoporosis is linked to various risk factors, including age, gender, genetic predisposition, and lifestyle factors such as physical inactivity, smoking, and excessive alcohol consumption.

The present investigation has revealed that the implementation of hormonal therapy and pharmacological interventions, including bisphosphonates and teriparatide, exhibit a significant degree of efficacy in the prevention of osteoporosis among individuals in their middle age. It is imperative to note that drug utilization should be conducted under the guidance of a medical practitioner and adhere to the appropriate dosage to avert perilous adverse reactions.

Furthermore, adopting a nutritious diet that includes calcium and vitamin D-rich foods, coupled with consistent physical activity, has demonstrated efficacy in mitigating the risk of osteoporosis. However, it is important to note that osteoporosis risk is influenced by factors beyond just maintaining a healthy lifestyle.

References

- Ahsan, M. M., Mahmud, M. A. P., Saha, P. K., Gupta, K. D., & Siddique, Z. (2021). Effect of Data Scaling Methods on Machine Learning Algorithms and Model Performance. *Technologies*, 9(3). <https://doi.org/10.3390/technologies9030052>
- Albrecht, B. M., Stalling, I., Foettinger, L., Recke, C., & Bammann, K. (2022). Adherence to Lifestyle Recommendations for Bone Health in Older Adults with and without Osteoporosis: Cross-Sectional Results of the OUTDOOR ACTIVE Study. *Nutrients*, 14(12). <https://doi.org/10.3390/nu14122463>
- Amatori, S., Zeppa, S. D., Preti, A., Gervasi, M., Gobbi, E., Ferrini, F., Rocchi, M. B. L., Baldari, C., Perroni, F., Piccoli, G., Stocchi, V., Sestili, P., & Sisti, D. (2020). Dietary habits and psychological states during covid-19 home isolation in italian college students: The role of physical exercise. *Nutrients*, 12(12), 1–17. <https://doi.org/10.3390/nu12123660>
- Cazares-Manríquez, M. A., Wilson, C. C., Vardasca, R., García-Alcaraz, J. L., Olguín-Tiznado, J. E., López-Barreras, J. A., & García-Rivera, B. R. (2020). A review of carpal tunnel syndrome and its association with age, body mass index, cardiovascular risk factors, hand dominance, and sex. *Applied Sciences (Switzerland)*, 10(10). <https://doi.org/10.3390/app10103488>
- Cheng, C. H., Chen, L. R., & Chen, K. H. (2022). Osteoporosis Due to Hormone Imbalance: An Overview of the Effects of Estrogen Deficiency and Glucocorticoid Overuse on Bone Turnover. In *International Journal of Molecular Sciences* (Vol. 23, Issue 3). MDPI. <https://doi.org/10.3390/ijms23031376>
- Collado-Mateo, D., Lavín-Pérez, A. M., Peñacoba, C., Del Coso, J., Leyton-Román, M., Luque-Casado, A., Gasque, P., Fernández-Del-olmo, M. Á., & Amado-Alonso, D.

- (2021). Key factors associated with adherence to physical exercise in patients with chronic diseases and older adults: An umbrella review. In *International Journal of Environmental Research and Public Health* (Vol. 18, Issue 4, pp. 1–24). MDPI AG. <https://doi.org/10.3390/ijerph18042023>
- Cormick, G., & Belizán, J. M. (2019). Calcium intake and health. In *Nutrients* (Vol. 11, Issue 7). MDPI AG. <https://doi.org/10.3390/nu11071606>
- Ge, B., Wang, H., Li, J., Liu, H., Yin, Y., Zhang, N., & Qin, S. (2020). Comprehensive Assessment of Nile Tilapia Skin (*Oreochromis niloticus*) Collagen Hydrogels for Wound Dressings. *Marine Drugs*, 18(4). <https://doi.org/10.3390/md18040178>
- Kim, B., Kim, G. M., Kim, E., Park, J., Isobe, T., Mori, Y., & Oh, S. (2022). The Anthropometric Measure ‘A Body Shape Index’ May Predict the Risk of Osteoporosis in Middle-Aged and Older Korean People. *International Journal of Environmental Research and Public Health*, 19(8). <https://doi.org/10.3390/ijerph19084926>
- Kim, J., Lee, W., & Lee, S. H. (2020). A systematic review of the guidelines and Delphi study for the multifactorial fall risk assessment of community-dwelling elderly. In *International Journal of Environmental Research and Public Health* (Vol. 17, Issue 17, pp. 1–23). MDPI AG. <https://doi.org/10.3390/ijerph17176097>
- Pludowski, P., Takacs, I., Boyanov, M., Belaya, Z., Diaconu, C. C., Mokhort, T., Zherdova, N., Rasa, I., Payer, J., & Pilz, S. (2022). Clinical Practice in the Prevention, Diagnosis and Treatment of Vitamin D Deficiency: A Central and Eastern European Expert Consensus Statement. In *Nutrients* (Vol. 14, Issue 7). MDPI. <https://doi.org/10.3390/nu14071483>
- Ratajczak, A. E., Zawada, A., Rychter, A. M., Dobrowolska, A., & Krela-Kaźmierczak, I. (2021). Milk and dairy products: Good or bad for human bone? practical dietary recommendations for the prevention and management of osteoporosis. In *Nutrients* (Vol. 13, Issue 4). MDPI AG. <https://doi.org/10.3390/nu13041329>
- Rzymiski, P., Zeyland, J., Poniedziałek, B., Małecka, I., & Wysocki, J. (2021). The perception and attitudes toward covid-19 vaccines: A cross-sectional study in poland. *Vaccines*, 9(4). <https://doi.org/10.3390/vaccines9040382>
- Sáez-López, J. M., Cózar-Gutiérrez, R., González-Calero, J. A., & Carrasco, C. J. G. (2020). Augmented reality in higher education: An evaluation program in initial teacher training. *Education Sciences*, 10(2). <https://doi.org/10.3390/educsci10020026>
- Stanton, R., To, Q. G., Khalesi, S., Williams, S. L., Alley, S. J., Thwaite, T. L., Fenning, A. S., & Vandelanotte, C. (2020). Depression, anxiety and stress during COVID-19: Associations with changes in physical activity, sleep, tobacco and alcohol use in Australian adults. *International Journal of Environmental Research and Public Health*, 17(11), 1–13. <https://doi.org/10.3390/ijerph17114065>
- Woźniak, D., Cichy, W., Dobrzyńska, M., Przysławski, J., & Drzymała-Czyż, S. (2022). Reasonableness of Enriching Cow’s Milk with Vitamins and Minerals. In *Foods* (Vol. 11, Issue 8). MDPI. <https://doi.org/10.3390/foods11081079>