Published online: 31/01/2016 Published print: 02/2016

ORIGINAL PAPER

doi: 10.5455/medarh.2016.70.66-68
Med Arch. 2016 Feb; 70(1): 66-68
Received: November 29th 2015 | Accepted: January 11th 2016

Correlation of Osteoporosis and Calcium Urolithiasis in Adult Population

Radojka Bijelic[1], Snjezana Milicevic[2], Jagoda Balaban[3]

[1]Primary Health Care Center, Banja Luka, Bosnia and Herzegovina
[2]Urology Clinic, University Clinical Center Banja Luka, Bosnia and Herzegovina
[3]Clinic of Dermatology and Venereal Diseases, University Clinical Center Banja Luka, Bosnia and Herzegovina

Corresponding author: Radojka Bijelic, MD MSc, Health Center Banja Luka, B&H. ORCID ID: http://orcid.org/0000-0001-9148-1230. E-mail: rada.bijelic@gmail.com

ABSTRACT

Introduction: Scientific studies indicate that there is a correlation between decreased bone mineral density and the age of the patient, especially in post menopausal women. **Goal:** The aim of our study was to assess the connection between osteoporosis and the age of respondents, based on the DEXA findings in patients with calcium urolithiasis. **Material and methods:** The study was prospectively and conducted in University Clinical Center Banja Luka, at the Urology Clinic and Clinic of Internal Medicine. In this study the respondents were divided into two groups: experimental group–subjects with calcium urolithiasis and control group without calcium urolithiasis. The study included 240 patients, in both groups of 120 patients who were divided into three age groups: 20-40 years, 40-60 years and more than 60 years. In both groups of respondents was conducted determination of bone mineral density in L2-L4 vertebra lumbar spine and hip by DEXA method. **Results:** Observing the whole sample of the experimental group, according to age groups it can be noticed that DEXA results are at 72.5% normal, 27.5% below expected value, more in women within older subgroups, 20% show signs of osteopenia and osteoporosis in 7.5 %. Share of patients with osteoporosis is statistically different ($p<0.05$) only between sub-groups 20-40 years and over 60 years. Although appears absolute difference in the participation of patients with osteopenia by age groups, the differences are not statistically significant ($p>0.05$). The share of patients with normal DEXA values was significantly lower in the group over 60 years compared to the other two age groups ($p<0.05$). At age subgroups of the control group, the youngest group of respondents share with normal DEXA finding is 95% and among the oldest group (over 60 years) this share is much lower and is 60%, which represents a statistically significant difference, and confirms the relationship ($p<0.01$). Normal DEXA findings decreases with increasing years, the share of those who do not have normal findings is higher in the elderly population. **Conclusion:** Our study has just shown that in adult patients with calcium urolithiasis osteoporosis is more prevalent in older patients and more pronounced in patients with calcium urolithiasis in relation to the population without the same.

Key words: Osteoporosis, DEXA, calcium urolithiasis.

1. INTRODUCTION

Osteoporosis is a progressive and systemic metabolic bone disease characterized by a reduction in bone mineral density and microarchitecture of bone tissue, resulting in increased bone fragility, increased risk of fractures and other pathological diseases (1). In particular, rapid bone loss occurs in the elderly, especially women in menopause and an additional problem in this group is a negative balance of calcium, which is doubled during the period of menopause (2). Excess hormones such as parathyroid hormone and estrogen levels, can result in additional loss of calcium in the elderly population which results in formation of calcium stones in patients (3-7). However, the pathogenic mechanisms and factors that are associated with loss of bone mineral mass and osteoporosis in patients with calcium uro-

lithiasis are not completely understood and are in the clinical testing phase (8-10).

2. GOAL

The goal of this study was to assess the relation between osteoporosis and calcium urolithiasis by DEXA findings in adult patients.

3. MATERIAL AND METHODS

The research was prospective and carried out at the University Clinical Center of RS, at the Clinic of Urology and Clinic of Internal Medicine. The material in the study consisted of patients classified into two groups–experimental and control. In each group there were 120 respondents who are divided by age into three sub groups: 20-40 years. 40-60 years and over 60 years. All patients made ultrasonographic examination of the abdomen and kidneys. Those with established urolithiasis are listed in the experimental group. They were made and additional diagnostic tests: Intravenous urography, native X-ray image of the urinary tract, laboratory tests. Excluding factors were malignant disease, inflammatory calculus, bisphosphonates therapy, increased levels of uric acid. Respondents with normal ultrasound findings of the urinary tract were candidates for the control group. After that all the respondents the experimental and control groups in order to determine bone mineral density has underwent densitometry (DEXA) at L2-L4 lumbar spine and hip level–upper part of the femur, which includes the neck of the femur, using LUNAR DPX Product Division Americus GE Healthcare (GENERAL ELECTRIC COMPANY, 2006).

4. RESULTS

Our study included a total of 240 subjects, 120 subjects divided into two groups: experimental and control, divided by age into three subgroups. Control group is consisted of healthy patients without calculosis. Descriptive measures that describe the subjects in the experimental group are shown in the Table 1. Analyzing bone mineral density of respondents in experimental group, by DEXA findings come to the following conclusions; in the subgroup of 20-40 years 85% of respondents have a normal finding, in 12.5% of subjects is present osteopenia and in 2.5% of respondent's osteoporosis. In the sub group of 40-60 years normal DEXA findings had 77.5% of the respondents, 17.5% had osteopenia and 5% had osteoporosis. In the subgroup over 60 years, the share of osteopenia is much higher, 30.0%; normal findings 55%, and osteoporosis in 15.0% of patients (Table 2). Descriptive measures that describe the subjects in the control group are shown in the Table 3. Analyzing bone mineral density, by DEXA in the control group we can see in the youngest age subgroup from 20-40 years the DEXA finding was normal in 95% of patients, osteopenia was present in 5% of patients and osteoporosis was not represented. In the subgroup of 40-60 years' normal findings was present in 75% of patients, osteopenia had 25% of respondents and osteoporosis was not present. In the subgroup of over 60 years normal findings had 60% of respondents, osteopenia had 37.5% and osteoporosis was present in 2.5% of patients. Neatness findings DEXA decreases with increasing years, the share of those who do not have normal findings is higher in the elderly population (Table 4).

N	Valid	120
	Missing	0
Mean		50.19
Median		52
Mode		59
Std. Deviation		15.60
Minimum		21
Maximum		86

Table 1. The mean of the age structure of the respondents in experimental group

			DEXA			Total
			Osteopenia	Osteoporosis	Normal	
Age group	20–40	N	5	1	34	40
		%	12.5%	2.5%	85.0%	100,0%
	40–60	N	7	2	31	40
		%	17.5%	5.0%	77.5%	100,0%
	> 60	N	12	6	22	40
		%	30.0%	15.0%	55.0%	100,0%
Total		N	24	9	87	120
		%	20.0%	7.5%	72.5%	100.0%

Table 2. Results of DEXA according to the age groups of the experimental group

N	Valid	120
	Missing	0
Mean		48.68
Median		49.00
Mode		23.00
Std. Deviation		17.03
Minimum		19.00
Maximum		79.00

Table 3. Descriptive measures that describe the age category of the control group

			DEXA			Total
			Osteopenia	Osteoporosis	Normal	
Age group	20–40	N	2	0	38	40
		%	5.0%	0.0%	95.0%	100.0%
	40–60	N	10	0	30	40
		%	25.0%	0.0%	75.0%	100.0%
	> 60	N	15	1	24	40
		%	37.5%	2.5%	60.0%	100,0%
Total		N	27	1	92	120
		%	22.5%	0.8%	76.7%	100.0%

Table 4. DEXA findings by age structure of the control group

5. DISCUSSION

Osteoporosis is a metabolic bone disease characterized by a progressive reduction in bone mineral density and disruption of its structure so, consequently, insufficient bone mineralization, which results in reduction of its strength and elasticity and an increased possibility of the incidence of fractures (11). It is a disease faced by

the so-called population. "Third age", or the elderly and more females as a result of the fact that they have a 30% lower bone mass than men, and that among them there is a rapid process of losing bone mass entering the menopause and the appearance of ovarian insufficiency (12). According to the latest research, the number of people who were diagnosed osteoporosis will double in the next 50 years, the follow-aging world population and the impact of various factors, among which important is a way of life. Osteoporosis is a major cause of serious disability of older people. Many authors in their studies described reduced bone mineral density (osteopenia/osteoporosis) in patients with calcium urolithiasis and hypercalciuria, but also reduced bone mineral density is determined in patients with normal values of serum calcium (13,14,15).

More recent literature data suggest that the clinical and epidemiological studies found in elderly patients with urolithiasis, increased bone turnover and reduced bone mineral density (13). In support of a reduced bone density (BMD) and mostly epidemic studies, which have shown that the elderly, especially post menopausal women with urolithiasis had a significantly higher prevalence of low bone mineral density compared to the male population, and higher rates of fracture compared to the control, predominantly male, population (16). It is thought that the limited intake of calcium in the elderly through diet and increased its loss through the kidneys, contributes to osteopenia/osteoporosis in this age category adult population. Literature data show that the share of the normal values of bone density (DEXA) gradually decreases with the age structure of the adult population, or osteoporosis is more common in the elderly (over 60 years) (13). By analyzing the bone mineral density at the total sample in our experimental group with urolithiasis, and bearing in mind the foregoing, the findings DEXA was in 27.5% of cases below the expected value and more in women older subgroups: 20% osteopenia and osteoporosis 7.5 %. By analyzing the results by age groups of respondents in experimental group (20-40 years, 40-60 years, over 60 years) it showed that the respondents in oldest subgroup, over 60 years, have reduced bone mineral density in 45% of cases (30% osteopenia and 15% of osteoporosis), and significantly more pronounced in relation to the other two age groups (12.5% in the subgroup of 20-40 years, and 17.5% in the sub-group of 40-60 years old), which represents a statistically significant difference ($p < 0.05$). In the control group, with an average age of respondents of 48.68 years, we have analyzed the bone mineral density, by DEXA findings by age groups as in the experimental group. The results that we got confirmed the above literature data; looking at age groups osteopenia and osteoporosis was observed in 37.5% in the group of patients over 60 years old, while the youngest sub-group (20-40 years) only in 5% was found osteopenia, or share with a normal DEXA was significantly higher in patients sub-group of 20-40 years compared to the other two age groups ($p<0.05$). Analysis of the results of the experimental and control groups showed that osteopenia and osteoporosis was particularly present in the older age group in both groups compared to younger age groups, but that this phenomenon was more pronounced in the experimental group, i.e. patients with calcium stone disease.

6. CONCLUSION

Bone mass loss and osteoporosis in patients with calcium urolithiasis is much more pronounced in the elderly compared to younger respondents. Bone loss and osteoporosis in the elderly is more pronounced in patients who have a calcium urolithiasis, in comparison to a population in which the same is not present.

- **Author's contribution:** All authors contributed in all phases of preparing this article. Final proof reading was made by first author.
- **Conflict of interest: none declared.**

REFERENCES

1. Kanis JA. Assessment of osteoporosis at primary health care level. WHO Scientific group tehnical report. Geneva: World Health Organization, 2007.
2. González- Mercado A, Sánchez- López JY, Ibarra B. Risk factors for osteoporosis in post menopausal women from Guadalajara, Jelisco. Salud Publica Mex. 2013; 55(6): 627-30.
3. Milicevic S, Bijelic R, Jakovljevic B. Correlation of Parathormone and the Serum Values of Acidum Uricum with Calcium Nephrolithiasis Examined by Three Different Methods of Diagnostics. Acta Infom Med. 2015 Jun; 23(3): 132-4 .
4. Kim G, Oh KW, Jang EH. Relationship between vitamin D, parathyroid hormone, and bone mineral density in elderly Koreans. J Korean Med Sci. 2012; 27: 636-43.
5. Mendosa-Romo MA, Ramirez-Arriola MC, Velasco-Chávez JF. Parity and menarche as risk factors for osteoporosis in post menopausal women. Ginecol Obstet Mex. 2014; 82(2): 75-82.
6. Heller HJ. The role of calcium in the prevention of kidney stones. J Am Coll Nutr. 1999; 18: 373-8.
7. Kavanagh JP, Laube N. Why does the Bonn Risk Index diskriminate between calcium oxalate stone formers and healthy controls? J Urol. 2006; 175: 766-70.
8. Arrabal- Polo MA, Arrabal- Martin M, de Haro- Munoz T. Mineral density and bone remodeling markers in patients with calcium lithiasis. BJU Int. 2010; 108: 1903-8.
9. Bergsland KJ, Kinder JM, Asplin JR, Coe BJ, Coe FL. Influence of gender and age on calcium oxalate crystal growth inhibition by urine from relatives of stone forming patients. J Urol. 2002; 167: 2372-6.
10. Laube N, Hergarten S, Hoppe B, Schmidt M, Hesse A. Determination of the calcium oxalate crysalization risk from urine samples: the Bone Risk Index in comparison to other risk formulas. J Urol. 2004; 172: 355-9.
11. National Osteoporosis Foundation. *Clinician's Guide To Prevention and Treatment of Osteoporosis*.Washington, DC, USA: National Osteoporosis Foundation; 2010.
12. Grgurevic A, Gledovic Z, Vujasinovic-Stupar N. Factor associated with post menopausal osteoporosis: a case-control study of Belgrade women. Women Health. 2010; 50: 475-90.
13. Bijelic R, Milicevic S, Balaban J. Incidence of Osteoporosis in Patients with Urolithiasis. Med Arch. 2014 Oct; 68(5): 335-8. doi: 10.5455/medarh.2014.68.335-338.
14. Tsuji H, Umekawa T, Kurita T. Analysis of bone mineral density in urolithiasis patients. Int Urol. 2005; 12: 335-9.
15. Jaeger P, Lippuner K, Casez JP, Hess B, Ackermann D, Hug C. Low bone mass in idiopathic renal stone formers: magnitude and significance. J Bone Miner Res. 1994; 9: 1525-32.
16. Dawson- Hughes B, Harris SS, Palermo NJ. Treatment with potassium bicarbonate lowers calcium excretion and bone resorption in older men and women. J Clin Endocrinol Metab. 2009; 94: 96-102.