ORIGINAL ARTICLE

Low Bone Mass Secondary to Antipsychotic Medications

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ABSTRACT

Background and Objective: Antipsychotic medications are known to cause low bone mass. The objective of this study was to assess the prevalence of osteopenia and osteoporosis secondary to patients taking antipsychotic medications.

Patients and Methods: This prospective study included 175 patients taking antipsychotic medications and attending the psychiatric clinics at the King Fahd Hospital of the University, Al-Khobar, Saudi Arabia. Demographic data, antipsychotic medications, type, and duration of administration of medication were collected. All patients had bone mass measurement using dual energy X-ray (DXA) absorptiometry. Patients were divided into 5-year groups, from ≤35 to ≥51 years. The data were entered in the database and analyzed using SPSS Inc version 20.

Results: The average age of patients was 40.75 ± 7.16 years (range: 26–56 years), there were 120 (82.8%) males and 25 (17.2%) females. Our results indicate that the average duration of anti-psychotic medication use was 8.45 ± 5.4 years. DXA of the hip revealed that 25 (14.2%) patients were osteoporotic and 104 (59.42%) were osteopenic, while on the basis of the T-score of the lumbar spine, 77 (44%) patients were osteoporotic and 80 (45.7%) were osteopenic. On the basis of the spinal bone mineral density (BMD), 89.7% had low bone mass.

Conclusion: Anti-psychotic medications have a strong influence on the reduction of bone mass even in younger populations. The BMD of patients who are prescribed anti-psychotic medication need to be monitored for low bone mass and provided with the appropriate treatment.

Key words: Osteopenia, osteoporosis, psychiatric medications

ملخص البحث :

هدفت هذه الدراسة إلى قياس معدل انتشار هشاشة العظام بين المرضى الذين يتناولون أدوية نفسية . وقد تم ذلك بدراسة مستقبلية ضمت ٥٧١ مريضا من مستشفى الملك فهد الجامعي بالخبر. وضحت نتائج الدراسة أن (٢,٤١٪) من المرضى كانوا يعانون من هشاشة العظام أما على مقياس (enocS-T) للعمود الفقري فقد كان ٤٤٪ من المرضى الذين يعانون من هشاشة العظام و ٧,٥٤٪ يعانون من ترقق العظام. وخلصت الدراسة إلى أن الأدوية النفسية لها تأثير كبير على خفض كتلة العظام حتى لدى المرضى الأصغر سناً ولذا ينصح متابعة المرضى الذين يتناولون الأدوية النفسية لفحص كثافة العظام وعلاج النقص فيها.

INTRODUCTION

Osteoporosis in postmenopausal women and in elderly males is the effect of the aging process and is estimated to affect over 200 million people worldwide.[1] It is estimated that one fracture occurs every 3 seconds as a

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direct cause of osteoporosis.[2] Secondary osteoporosis is more common in the younger population, but little attention has been given to it. Secondary osteoporosis has been reported as resulting from proton pump inhibitors, glucocorticoids aromatase inhibitors, and chemotherapy.[3-8] Recent studies have shown an obvious link between anti-psychotic medications and osteoporosis.[9-12]

Low bone mass (osteopenia and osteoporosis) is quite common in men and in postmenopausal women in Saudi Arabia, with prevalence reaching over 50% in men and women over the age of 55 years.[13] Literature is replete with reports on secondary osteoporosis in general and particularly with patients on anti-psychotic medications, even though neuro-psychiatric illnesses in Saudi Arabia is estimated to be 14% of the global burden of psychiatric illnesses.[14,15] There are sporadic reports on psychiatric illnesses in Saudi Arabia but none on the role of psychiatric medications and their influence on the development of osteoporosis.[16,17]

This prospective study was undertaken to evaluate the extent to which psychiatric medications cause low bone mass in Saudi Arabian patients.

PATIENTS AND METHODS

A total of 145 patients (120 males, 25 females) attending the psychiatric clinics at the University of Dammam between January and December 2013 were included in the study. Participants were included in the study if they were ≥ 35 years of age and had been taking anti-psychotic medications for at least 1 year. Demographic data from all participants were collected. A dual energy X-ray (DXA) scan using a Hologic machine was done (Discovery, Hologic Inc. Bedford MA, USA). Osteopenia (T-score 1 to <-2.5) and osteoporosis (≤ -2.5) were based on the World Health Organization (WHO) definition of bone health, which depends on bone mineral density (BMD). Patients with other co-morbidities, such as severe heart failure, uncontrolled diabetes mellitus, sickle cell disease, end-stage renal disease, and those on steroids were excluded.

The data were entered into the database and analyzed using SPSS Inc. version 20 (SPSS Inc Version 20, Chicago, Illinois, United States). A $P < 0.05$ was accepted as significant at 95% confidence interval (95% CI). The study was approved by the Ethical and Research committee of the University of Dammam.

RESULTS

A total of 145 patients (82.8% males and 17.2% females) were included in the study. The average age of the patients was 40.75 ± 7.16 years (range: 26–56 years). The average duration of the use of anti-psychotic medications was 8.45 ± 5.4 years. On the basis of DXA of the hip, it was determined that 25 patients (14.2%) were osteoporotic and 104 (59.42%) were osteopenic, while on the basis of the T-score of the lumbar spine, 77 (44%) were osteoporotic and 80 (45.7%) osteopenic. On the basis of the spinal BMD, 130 (89.7%) had low bone mass.

Table 1 shows the difference between male and female patients with regard to age, duration of medication use, and the difference between the BMD findings. Females were significantly older and had used medication for a longer period. It was found that in the spine, males had more osteopenia and less osteoporosis $P < 0.001$ with 95% CI. In contrast, females had a significantly higher BMD than males for normal and osteopenia $P < 0.0082$, 95% CI < 19.138, and <0.001 95% CI < 91.27. Tables 2 and 3 show the 5-year age range for the duration of medication use and the T score for the hip and lumbar spine.

Figure 1 shows the medication that the patient groups were taking. The four groups of drugs prescribed were antipsychotics, antidepressants, anticonvulsants, and mood stabilizers. Table 4 gives the comparison between the patients receiving psychiatric medications and normal controls.

DISCUSSION

This study shows that over 60% of patients taking medications for psychiatric illnesses lose bone mass and

Table 1: Comparison between male and female patients

Parameter	Males (%)	Females (%)	*P* (significance <0.05)
Number of patients	145	30	
Average age (years)	40.27±7.21	42.65±7.07	<0.01
Duration of drugs (years)	8.29±0.4.65	9.41±8.23	<0.05
Normal BMD (spine)	14 (9.6)	2 (6.67)	<0.008
Osteopenia (spine)	68 (46.9)	13 (43.33)	<0.001
Osteoporosis (spine)	63 (43.5)	15 (50)	<0.001
Normal BMD (hip)	20 (13.7)	9 (30)	<0.0082
Osteopenia (hip)	94 (64.8)	14 (46.7)	<0.001
Osteoporosis (hip)	31 (21.37)	7 (23.33)	<0.02

BMD – Bone mineral density

Table 2: Male patients with 5-year range for duration of drugs and the T score for hip and lumbar spine

Age in years (mean±SD)	Number of patients	Duration (years)	Hip T-score	Lumbar spine T score
≤30 (29.3±1.1)	3	4.66±2.3	−1.8±0.1	−2.46±0.4
31-35 (33.25±1.8)	39	3.81±3.4	−1.8±0.7	−2.05±0.86
36-40 (37.9±1.47)	51	10.45±4.1	−1.55±0.86	−2.06±0.9
41-45 (44.5±0.7)	13	10.61±4.9	−1.61±1	−2.55±1.26
46-50 (47.71±0.7)	21	7.85±0.35	−1.71±0.27	−2.05±−0.6
>51 (53.94±1.34)	18	12±2.9	−1.9±0.36	−2.8±1.3

SD – Standard deviation

Table 3: Female patients with 5-year range for duration of drugs and the T score for hip and lumbar spine

Age in years (mean±SD)	Number of patients	Duration (years)	Hip T-score	Lumbar spine T score
≤30 (28±2.8)	3	2.5±0.7	−2±0.1	−2.5±0.28
31-35 (33.25±1.8)	5	5	5	5
36-40 (38.4±1.51)	11	11	11	11
41-45 (43.7±0.7)	4	4	4	4
46-50 (46.67±1.32)	4	4	4	4
>51 (54.66±1.1)	3	3	3	3

SD – Standard deviation

Table 4: Comparison between patients and healthy controls

Parameter	Patients	Controls	*P* (significance <0.05)
Number of patients	175	150	
Average age (years)	40.75±7.16	45.25±6.5	<0.01
Normal BMD (spine)	16	132	<0.001
Osteopenia (spine)	81	18	<0.001
Osteoporosis (spine)	78	0	<0.001
Normal BMD (hip)	29	141	<0.0082
Osteopenia (hip)	108	9	<0.001
Osteoporosis (hip)	38	0	<0.001

BMD – Bone mineral density

develop osteoporosis or osteopenia though the latter appears to be more common than osteoporosis. It is unfortunate that the majority of the population with low bone mass were in their forties. In our study, we found that males outnumbered females. Downs *et al.* suggested that 70% of patients on anti-psychotic medications developed osteoporosis, although the duration of use and the dose taken influenced the development of the low bone mass.[18] However, Kishimoto *et al.* reported that low BMD was seen in all their patients in all age groups, irrespective of the dosage and duration of anti-psychotic medication when compared with healthy individuals.[12]

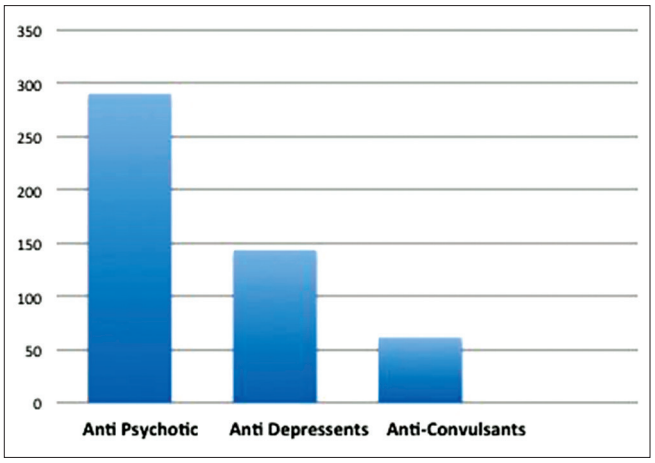

Figure 1: Pyschiatric medications assessed

Studies have confirmed that selective serotonin reuptake inhibitors (SSRIs) have a negative influence on bone mass.[19,20] We could not assess the effect of SSRIs alone on bone mass in our own patients as they were taking other medication, in addition to the anti-psychotic medication. Even though the National Osteoporosis Foundation in the US added SSRIs as one of the drugs which induce osteoporosis, our patients were neither investigated nor medicated to prevent osteoporosis.[21]

The issue of osteopenia and osteoporosis as a result of anti-psychotic and antidepressants is a serious one. As per the WHO assessment, there are 450 million people worldwide who suffer from psychiatric illnesses.[14] The Saudi population affected by neuro-psychiatric disease require anti-psychotic drugs and over 60–70% of these patients will develop drug-induced osteoporosis. To prevent osteopenia and osteoporosis in these patients, preventive measures need to be taken.

High prolactin levels are known to induce osteopenia and osteoporosis, and antipsychotic medications induce hyperprolactinemia in over 70% of patients with schizophrenia, depending on the medications used.[22,23] However, many other reports suggest that the prevalence was as high as 93%.[24] The mechanism by which hyperprolactinemia works is by creating an imbalance between bone reabsorption and bone formation.[25]

To the best of our knowledge, this is the first time a study on secondary osteoporosis resulting from anti-psychotic medications has been done in Saudi Arabia. However, our study includes figures that are based on BMD alone and other laboratory tests, such as the levels of Vitamin D were not undertaken. In addition, other factors, which could induce secondary osteoporosis were not taken into consideration.

CONCLUSION

Our study shows that 80% of the psychiatric patients included in the study, who had been prescribed anti-psychotic and anti-depressants were suffering from bone loss. The BMD of patients who are prescribed anti-psychotic medication need to be monitored for low bone mass and provided with appropriate treatment.

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Conflicts of interest
There are no conflicts of interest.

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