THE EFFECT OF PAMIDRONATE ON BONE MINERAL DENSITY IN PRIMARY OSTEOPOROSIS IN PAKISTANI POPULATION

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ABSTRACT

Objective: To study the protective effect of Bisphosphonates (Pamidronate) in patients of primary osteoporosis in Pakistani setup.

Study Design: Quasi experimental study.

Place and Duration of Study: The study was carried out at department of orthopedic and spine surgery, CMH Rawalpindi, from Sep 2011 to Sep 2013.

Material and Methods: A non probability convenience sample was collected from 50 patients who visited orthopaedics department with complaints of generalized aches and pains and diagnosed to have primary osteoprosis. Osteoporosis was confirmed by DEXA scan, with a T-score of more than -2.5. Pamidronate-a bisphosphonate, was given I/V on monthly basis along with oral calcium. After 6 month and one year DEXA scan was repeated to observe its effect on bone mineral density

Results: Osteoporosis T score of DEXA scan was seen to improve by 19.3% (0.193 T score improvement) with a *p*-value less than 0.05.

Conclusion: Pamidronate treatment increased bone mineral density in osteoprotic patients.

Keywords: BMD, Osteoporosis, Pamidronate.

INTRODUCTION

Osteoporosis is the most common bone illness in old age. We living in a third world nation the problem is magnified. In Pakistan population is expected to reach 226 million in 2020 and 335 million by year 2050 which means we would be having 16 million people (7.11%) in 2020 and 50 million people (14.9%) by 2050 above the age of 60 years[1]. The chances of getting this disease in old age are far greater. Osteoporosis is characterized by unbalanced rapid turnover of bone thus decreased bone density which leads to decrease bone strength and rise in incidence of fractures[2]. It occurs due to increased osteoclast activity, decreased osteoblast activity or both[2]. The best thing with advances in medical development is to diagnose osteoporosis before bone fractures and cure it with modern remedies. Fractures especially in lower limbs result in increased mortality and morbidity along with financial burden to family and state. There are many options for the treatment of Osteporosis[3]. Use of bisphosphonates is one of them. Bisphosphonates effectiveness in prevention of fractures is confirmed by the Fracture Intervention Trial[4].

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MATERIAL AND METHODS

It was a quasi experimental study performed at department of Orthopaedics and Spine Surgery CMH, Rawalpindi. The study was conducted from Sep 2011 till Sep 2013. All those patients agreeing to participate in this study were enrolled. 50 consecutive outpatient department were selected having symptoms of generalized aches and pains and diagnosed to have primary osteoporosis by DEXA scan T score of more than -2.5. All patients having secondary osteoporosis were excluded from the study.

In the beginning every patients particulars, age, gender height, weight and DEXA T Score was recorded at AFIRM, Rawalpindi after

confirming to have normal renal functions and within normal range free calcium levels.

They had monthly intra venous injection of Pamidronate (AMINOMUX) 30 mg after dilution in 500 milliliters of Isotonic saline. This infusion was run in over 30 minutes. For this injection therapy all the patients were admitted for one day in hospital and discharged if they had no problems in general well being. Injection (Phenergan) 10 mg intramuscularly and injection Acetaminophen 500 mg intravenous was given in case they developed shivering or body aches and pains during administration of Bisphosphonate injection; besides Bisphosphonate an oral dose of Calcium 1200 mg, Vit. D 800 micrograms daily was given.

DEXA Scan was repeated from AFIRM after one year of treatment and T Score was measured again.

The results we analyzed using SPSS ver 21. Mean and SD were calculated for quantitative variables. Paired t-test was applied for the pre and post comparison. A *p*-value <0.05 considered as a significant value.

RESULTS

Fifty patients were enrolled but 13 patients left the study. So 37 (74%) completed the study. The mean age was 61.93 years (± 9.273) years and the range 51 to 80 years. The average height was 155 (± 7.806) cm. Mean weight was 62.23 (± 9.178) Kgs. The frequency of male in the study was 7 (14%) and females was 43 (86%).

The mean T score before start of the study was -3.033 (SD ± 1.45) and the post therapy was-2.831 (SD ± 0.4644). Independent t-test was used to compare the means pre and post therapy and The *p*-value was less than 0.05 (0.009) which shows a statistically significant difference despite the less number of subjects in the study.

DISCUSSION

Bisphosphonates are derived from naturally occurring inorganic pyrophosphate (PPi). There are two phosphates PO(OH) esterified in its structure. This is the reason they are known as Bisphosphonates[4]. In non medical usage they were used as water softener in irrigation. After extensive research in late last century first Bisphosphonate-Alandronate (Fosamax) was launched by Merck & Co in 1990's[5]. Bisphosphonates are mainly of two sub classes, non Nitrogen containing like Etidronate, Clodronate, Tiludronate and Nitrogen containing bisphosphonates Pamidronate, Neridronate, Olpadronate, Alendronate, Ibandronate, Risedronate. Pamidronate. Once ingested or infused it is rapidly taken up by bones. About 50% is not adsorbed by bones and it is excreted through kidneys. This drug mimicks Proton Pump inhibiters so they are ingested by osteolasts as in normal metabolism of bone. Once inside osteclasts they block HMG Co A reductase path way to work, resulting in apoptosis of osteoclasts[6]. Hence decrease in breakdown of the bone and increase in density. Evidence shows that they reduce the risk of fracture in post-menopausal women with osteoporosis[7]. This therapy is recommended for three to five years for patients of osteoporosis and its effects are known to stay for five to ten years[8]. The bottom line of treatment is that the choice of regime be made carefully in consultation with patient's preference, the patient should respond to the treatment and in case a complication occurs the tailoring of treatment be made and necessary adjustments be done.

Dual-energy x-ray absorptiometry (DXA) scanners are routinely used in hospitals since 1987[9]. Osteoprosis is diagnose by measuring BMD of the central and axial skeleton. This scan is done on an open x-ray table as compared to tunnel or ring for MRI and CT scan. This is pain less and takes ten to twenty minutes. The machine emits two x-ray beams one after another. The first is high energy and other is low energy. The machine measures the difference according to thickness of bone. T score measures the density of patient in comparison with that of 30 years old person of good health. WHO T-score definitions of osteoporosis and osteopenia is:

- T-score of -1.0 or above = normal bone density.
- T-score between -1.0 and -2.5 = low bone density, or osteopenia.
- T-score of -2.5 or lower = osteoporosis.

At times Z score is given which compares density of patient with that of a normal person of same age and body size. We preferred injectable drug for the reason of making sure that the patients take this medication. Otherwise the treatment with oral alendronate is a good alternative. Pamandronate is also a good choice in case of gastrointestinal side effects or contraindications for oral bisphosphonates like gastritis or esophagitis[10].

Heijckmann et al conducted a study to compare effect of oral Alderonate and intra-venous pamidronate Patients were included in the study who were started on treatment with either oral alendronate 10 mg/day or intravenous pamidronate 60 mg/3 months. Twenty patients were allocated to each group. The first choice for bisphosphonate treatment of osteoporosis was oral alendronate. Intravenous pam-idronate was given to patients with gastr ointestinal contraindications for oral bisphosphonate (n=9) or with intolerance of oral bisphosphonate (within 1 month of initiation of bis-phosphonate therapy, n=11). Patients with previous treatment for longer than 1 month with anti-osteoporosis drugs were not included. It revealed both drugs are equally effective in increasing bone mineral density of vertebral spine and and hip[11]. Our research work co-relates with Peretz et al who showed Pamidronate infusion also decrease turnover of bones in postmenopausal related osteoprosis which leads to rise in bone mineral density of vertebral column[12].

The role of bisphosphonates was further extended by Wilkinson et al, who administered single 90mg intravenous injection of pamidronate which resulted in noteworthy decrease in bone damage after hip joint arthroplasty[13].

In a country like ours with meagre resources and osteoporosis in ambulatory population of upto 18% and osteopenia in 64%[14,15], early diagnosis and treatment is advisable. We did not find similar studies conducted in Pakistani settings.

CONCLUSION

We have found intravenous pamidronate an effective remedy in treatment of primary osteoporosis in Pakistani population as well. Most of patients who followed this treatment had improved bone mineral density with minimal side effects.

CONFLICT OF INTEREST

This study has no conflict of interest to declare by any author.

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