

Original Research Article

Evaluation of co-relation between hip fractures and vitamin D level

Pragnesh Patel, Vimal P. Gandhi*

Department of Orthopedics, GMERS Medical College, Dharpur, Patan, Gujarat, India

Received: 30 March 2021

Accepted: 04 May 2021

***Correspondence:**

Dr. Vimal P. Gandhi,

E-mail: vimalgandhi1968@gmail.com

Copyright: © the author(s), publisher and licensee Medip Academy. This is an open-access article distributed under the terms of the Creative Commons Attribution Non-Commercial License, which permits unrestricted non-commercial use, distribution, and reproduction in any medium, provided the original work is properly cited.

ABSTRACT

Background: Hip fractures are devastating injuries that most often affect the elderly and have a tremendous impact on both the health care system and society in general. Approximately 97% occur in patients over 50 years of age. It has been a general belief that rickets and vitamin D deficiency are uncommon problems in India because of abundant sunshine. Hence the aim was to identify patients with hip fractures and to attain the vitamin D levels in these patients.

Methods: The study was a descriptive type of study. Patients who fulfilled the inclusion criteria were included in the study. A total of 154 patients were included in the study. Patients were assessed clinically, with a thorough history and physical examination. The symptoms and signs elicited were recorded in a performa.

Results: Neck of femur (NOF) was more common in female patients and intertrochanteric (IT) fracture was common in male patients. These fractures were mainly seen in the age group between 61 to 70 years of age for hip fractures. It was also noted that anaemia was prevalent in both male and female patients and the overall vitamin D deficiency was 76% of the total number of patients with more predominant (84.6%) in female patients.

Conclusions: Treatment of the vitamin D deficiency reduces the chances of fall, morbidity and financial burden on the patient when fractures occur. The treatment of vitamin D deficiency will improve the quality of life overall. Hence the need for food fortification and supplementation in elderly Indian population.

Keywords: Femur, Vitamin D deficiency, Hip fractures

INTRODUCTION

The hip joint is a synovial articulation between the head of the femur and the acetabulum of the pelvic bone. The joint is a multiaxial ball and socket joint designed for stability and weight bearing at the expense of mobility. Hip fractures term is commonly used for fractures of the femoral head, neck and trochanter.¹ Hip fractures have a bimodal age distribution. Approximately 97% occur in patients over 50 years of age and only 3% in patients under 50. In the latter group, they occur most commonly between 20 and 40 years of age, usually in men and are due to high energy trauma associated with sports and industrial and motor-vehicle accidents.²

In this young group, most hip fractures are subtrochanteric or basicervical. Hip fractures are devastating injuries that most often affect the elderly and have a tremendous impact on both the health care system and society in general. Despite marked improvements in implant design, surgical technique and patient care, hip fractures continue to expensive to health care and the patient. Two studies have shown incidence increasing exponentially with age, doubling for every 6 years of age.³ A study by Martin et al attributed this increase to a gradual decline in physical activity, which contributes to the bone loss and it also noted that at 1 year after a hip fracture, mortality rates in elderly people range from 14% to 36%. The highest risk of mortality occurs in the first 6 months after fracture, after 1 year the mortality rate approaches that of persons who have not sustained a hip fracture.⁴

Vitamin D has been traditionally known as anti-rickets factor or sunshine vitamin. Vitamin D is unique because it is a vitamin synthesized by the body and it functions as a hormone. Besides its pivotal role in calcium homeostasis and bone mineral metabolism, vitamin D endocrine system is now recognized to subserve a wide range of fundamental biological functions in cell differentiation, inhibition of cell growth as well as immunomodulation.⁵ It is a steroid that regulates complex system of genomic functions and has a role in prevention of neo plastic transformation. Recent evidence from genetic, nutritional and epidemiological studies link vitamin D endocrine system with diseases like hypertension, myopathic disorders and proneness to infection, autoimmune disorders and cancer.⁶

It has been a general belief that rickets and vitamin D deficiency are uncommon problems in India because of abundant sunshine. There is, however, now increasing evidence that this is not true. It all centers round a new emerging global threat called vitamin D deficiency which is not merely rickets or osteomalacia but a huge hidden problem now being unraveled and is reaching epidemic proportions both in the developed and developing world alike.⁷

The problem has increased to alarming proportions after new definition of 25 OHD levels and its impact on bone health. This has also caused economic burden on government and patient. Hence the need for more studies on these lines. Hence the aim of the study was to identify patients with hip fractures and to attain the vitamin D levels in these patients.

METHODS

The study was a descriptive type of study and was conducted in medical college and associated hospital. The ethical committee was informed about the study and the ethical clearance certificate was obtained from them prior to the start of the study. All the patients were informed about the study and prior to inclusion of the study the informed consent was signed by the included patients. Patients who fulfilled the inclusion criteria mentioned below were included in the study.

Inclusion criteria

All patients with hip fractures and with patients aged more than 45 years, both male and female with a history of trivial fall, clinical symptoms suggestive of hip fractures (hip pain, painful limp, inability to walk, swelling) and clinical signs (swelling, ecchymosis, tenderness, painful range of movements) and radiological confirmation of fracture by X-rays were included in the study.

Exclusion criteria

Open fractures of hip, age <45 years, patients with pathological fractures, patients on chronic medication like steroids, antiepileptics, patients on treatment for vitamin d deficiency, patients with liver cell failure, cirrhosis and chronic renal failure and patients with fractures due to road traffic accident were excluded from the study.

A total of 154 patients were included in the study. Patients were assessed clinically with a thorough history and physical examination. The symptoms and signs elicited were recorded in a performa. Once the diagnosis of hip fractures were made then following test were done on day 1 of admission haemoglobin and vitamin D.

CLIA method: chemiluminescent immunoassay

In this study, CLIA method was used to estimate the vitamin d status was estimated and recorded. The data acquired was analysed by program like SPSS version 17 and using test like Fischer exact test, Chi square test, Pearson correlation test the data was analysed.

RESULTS

A total of 154 patients were included in the study. The age range of the patients was between 50 to 90 years. There were 76 males and 78 females in the study. Most of the patient presented on 2nd to 7th day post injury to the hospital, that is, out of 82 patients, 64 patients presented on the first day to the hospital and 8 patients presented after 7 days.

Table 1: Type of fracture.

Type of fractures	NOF	IT
Number of patients	78	76

Table 2: Level of vitamin D in the patients.

Vitamin D levels	<20 mg/ml	21-29 mg/ml	>30 mg/ml
Number of patients	108	18	18

Table 3: Type of fractures and vitamin D levels.

Type of fractures	<20 mg/ml	21-29 mg/ml	>30 mg/ml
Neck of femur	58	8	12
Intertrochanteric fracture	60	10	6

On analysis of type of fracture, there were 78 patients with NOF type and 76 patients with IT type of fracture (Table 1). There were 32 males and 46 females with NOF type fracture and there were 44 males and 32 females with IT type of fracture.

From data the maximum patients were from the age group between 61 to 70 years and least was found in age group more than 80 years. Further the mean was found to be 69.95 and mean±SD was 69.65±11.59. Range was between 50 to 90 years. In males, range was 50 to 90 years, and mean was 64.80. The mean±SD was 63.40±10.23. In females, range was 55 to 88, and mean was 68.39. The mean±SD was 68.39±14.26.

Age group versus type of fractures showed that the maximum incidence of fractures was seen in age group 61 to 70 years for both NOF and IT fractures. Vitamin D analysis in the patients showed that 108 patients had vitamin d level lower than 20 mg/ml, 18 patients had level 21-29 mg/ml and 18 patients had level more than 30 mg/ml level (Table 2). Vitamin D levels in males found to be deficient in 68% of the total male patients and 15% had normal values. Vitamin D levels in females found to be deficient in 84% of the total female patients and 9% had normal values. The analysis was done between the type of fracture and number of patients with low level of vitamin D. The analysis shows that in total of 78 patients with fracture of femur neck there were 58 patients with less than 20 mg/ml and 8 patients with vitamin D level 21-29 mg/ml and 12 patients with level greater than 30 mg/ml. Of the total 76 patients with intertrochanteric fracture there were 60 patients with <20 mg/ml vitamin D level, 10 patients had vitamin d level between 21-29 mg/ml and 6 patients with vitamin D level greater than 30 mg/ml (Table 3).

DISCUSSION

This study was conducted in medical college and associated hospital where 154 patients with hip fractures were admitted and analysed for periods of 2 years. In this study we found that male were 76 patients and female of 78 patients, this shows almost equal prevalence of hip fractures in both males and females. A study by Johnell et al studies shows that the world female and male ratio was 2:3. In India by Jha et al showed slightly high female to male ratio as similar to this study. Hence this implies that the incidence of male hip fractures is comparable to female. hence preventive and treatment for male patients are equally important in male patients.^{8,9}

The age in this study showed a mean of 69.65±11.59 overall, 64.80 and 68.39 for male and female patients respectively. Range was between 50 to 90 for both male and female patients. Further age at which hip fractures were encountered in this study showed maximum incidence at age of 61 to 70 years in both male and female patients but study by Johnell et al showed world studies have showed highest incidence between 70 to 80 years.¹⁰

The intertrochanteric fractures were found most common seen the age group of 61 to 70 years and similarly was neck of femur fracture, but in United States of America the incidence of intertrochanteric fractures is associated with elderly age. Hence this shows that the Indian population is quite different from other parts of the world. It is to be noted that the age at which intertrochanteric fractures occur is earlier. Also all the fractures in this study were encountered with fall or trivial trauma.¹¹

The most common type of intertrochanteric fractures when classified by Boyd and Griffin was that of the type 2 and neck of femur fracture was type 3 as per Garden's classification. Further neck of femur fracture was commonly seen in female patients and intertrochanteric fractures was commonly seen in male patients.¹²

In this we found most of the patients were from falls sustaining the fracture. Predominant patients presented to the hospital during 2nd to 7th day was 53.7% and 41% by the first day of injury. When parameters like calcium was noted, 57.1 % were below normal (<8.5) and was not significantly associated with type of fractures. In this study surgery was mainstay of treatment. Among the surgical modality, modular bipolar hemiarthroplasty was most common modality used for neck of femur fracture and proximal femoral nail was most common modality of treatment for intertrochanteric fractures

Vitamin D was found to be deficient in 76% of the total number of cases analysed which was significant. In this study the range was found to be 4 to 44.48 ng/ml and mean as 15.19±10.33. In a similar study by Khadagawat et al it was found 96.7% of the total number of cases, the range was 5-21.5 ng/ml and mean of 9.9±4.8. By comparison of the two study, we derive that vitamin D deficiency is very much prevalent in Indian population. Hence need for further evaluation and studies.

CONCLUSION

The incidence of neck of femur fracture was comparable with intertrochanteric fractures. The neck of femur was more common in female patients and intertrochanteric fracture was common in male patients. Both intertrochanteric and neck of femur fracture was common in 61 to 70 years age group. Most common type in neck of femur fracture based on Garden's classification was type 3. Most common type in intertrochanteric fracture based on Boyd and Griffin was type 2. Overall vitamin D deficient was 76%, female patients had more number of vitamin D deficiency as compared to male patients. In neck of femur fracture and intertrochanteric fracture-type 4, 100% vitamin D deficiency was present.

Funding: No funding sources

Conflict of interest: None declared

Ethical approval: The study was approved by the institutional ethics committee

REFERENCES

1. Mattila R. Hip and knee replacement implants: information package for nurses: Hoitonetti. Semin Scholar. 2012.
2. Robinson C, Court-Brown CM, McQueen M, Christie J. Hip fractures in adults younger than 50 years of age. Epidemiology and results. Clin Orthop Relat Res. 1995;(312):238-46.
3. Lu Y, Uppal HS. Hip fractures: relevant anatomy, classification, and biomechanics of fracture and fixation. Geriatr Orthop Surg Rehabil. 2019;10:2151459319859139.
4. Schnell S, Friedman SM, Mendelson DA, Bingham KW, Kates SL. The 1-year mortality of patients treated in a hip fracture program for elders. Geriatr Orthop Surg Rehabil. 2010;1(1):6-14.
5. Harinarayan C, Joshi SR. Vitamin D status in India-its implications and remedial measures. JAPI. 2009;57:40-8.
6. Kochupillai N. The physiology of vitamin D: current concepts. Indian J Med Res. 2008;127(3):256-62.
7. Roth DE, Abrams SA, Aloia J, Bergeron G, Bourassa MW, Brown KH, et al. Global prevalence and disease burden of vitamin D deficiency: a roadmap for action in low-and middle-income countries. Ann N Y Acad Sci. 2018;1430(1):44-79.
8. Kanis JA, Johnell O, Odén A, Johansson H, Laet CD, Eisman J, et al. Smoking and fracture risk: a meta-analysis. Osteoporos Int. 2005;16(2):155-62.
9. Sözen T, Özişik L, Başaran NÇ. An overview and management of osteoporosis. Eur J Rheumatol. 2017;4(1):46-56.
10. Kannus P, Palvanen M, Niemi S, Parkkari J, Järvinen M. Epidemiology of osteoporotic pelvic fractures in elderly people in Finland: sharp increase in 1970–1997 and alarming projections for the new millennium. Osteoporos Int. 2000;11(5):443-8.
11. Borkan JM, Quirk M, Sullivan M. Finding meaning after the fall: injury narratives from elderly hip fracture patients. Soc Sci Med. 1991;33(8):947-57.
12. Russell TA. Intertrochanteric fractures. In: Bucholz RW, Heckman JD, Court-Brown CM, Tornetta P, eds. 8th ed. Rockwood and Green's fractures in adults. Philadelphia: Lippincott Williams and Wilkins; 2010: 1597-640.

Cite this article as: Patel P, Gandhi VP. Evaluation of co-relation between hip fractures and vitamin D level. Int J Res Orthop 2021;7:764-7.