International Journal Of

Recent Scientific Research

ISSN: 0976-3031

Volume: 7(6) June -2016

CALCIUM MONO-THERAPY SUPPLEMENT USE AMONG PATIENTS TREATED FOR BONE FRACTURES IN A TERTIARY HOSPITAL, SOUTHWEST NIGERIA

Olakulehin O.A, Adeomi A.A and Amuwa C.O.F

THE OFFICIAL PUBLICATION OF
INTERNATIONAL JOURNAL OF RECENT SCIENTIFIC RESEARCH (IJRSR)
http://www.recentscientific.com/ recentscientific@gmail.com

ISSN: 0976-3031

Available Online at http://www.recentscientific.com

International Journal of Recent Scientific Research
Vol. 7, Issue, 6, pp. 11459-11462, June, 2016

International Journal of Recent Scientific Research

Research Article

CALCIUM MONO-THERAPY SUPPLEMENT USE AMONG PATIENTS TREATED FOR BONE FRACTURES IN A TERTIARY HOSPITAL, SOUTHWEST NIGERIA

Olakulehin O.A[1], Adeomi A.A[2] and Amuwa C.O.F[1]

[1]Surgery Department LAUTECH Teaching Hospital Ogbomoso Oyo State, Nigeria
[2]Community Medicine Department LAUTECH Teaching Hospital Ogbomoso Oyo State, Nigeria

ARTICLE INFO

Article History:

Received 17th March, 2016
Received in revised form 21st April, 2016
Accepted 06th May, 2016
Published online 28th June, 2016

Key Words:

Calcium mono-therapy supplement,
Bone fractures and bone healing

ABSTRACT

Fractures healed normally independent of dietary calcium for the first few weeks of healing. Adequacy of serum calcium level is important, but unusual high intake does not appear to speed up fracture healing process, rather it could have deleterious effect on the cardiovascular system. Complex multi-nutrient do reduce complications in fracture management whereas Non-steroidal anti- inflammatory drugs and Cox-2 inhibitor drugs impaired fracture healing.

Questionnaire based prospective study was designed to ascertain the prevalence of calcium supplement use among 101 consecutive patient being managed for fractures, inpatient and outpatient care inclusive.

57.4% (58) of the respondents were on calcium supplements, out of which only 12.1% were prescribed by the attending physicians**.** Males were 2.52 times more likely to use calcium than females, in-patients were 4.69 times more likely to use calcium than out-patients and those with poor perception about calcium usage were 10.56 times more likely to use calcium than those with good perception.

There is a need to regulate calcium mono-therapy supplement among the patients being treated for fractures by instituting a hospital policy on it. Patient education has to be improved on to minimize the potential danger of calcium mono-therapy supplements.

INTRODUCTION

Early research suggested that fractures can heal normally independent of dietary calcium and indeed it has been found that during the first few weeks of healing, Calcium is drawn from the Skeleton for fracture healing. After that, the diet provides the calcium necessary for fracture repair (Key J. A *et al*; 1995).

Adequacy of calcium at Serum level is important, but unusually high intake do not appear to speed up fracture healing process. Since the absorption of calcium is dependent on vitamin D, these nutrients work synergistically. Best fracture healing occurs when both calcium and vitamin-D are obtained in optimum daily levels (Doetsch. A *et al*; 2004).

Calcium mono-therapy has been shown to be associated with 50% increased risk of Hip fractures (Reid *et al*; 2008). Osteoporosis fractures showed 9 similar increase in his fracture risk with Calcium only therapy (Cumming RG *et al*; 1997). A Strong association between calcium mono-therapy supplementation and myocardial infarction, stroke and sudden death has also been established in another study. (Bolland *et al*; 2008)

A 2006 Swedish hip fracture study found fracture patients given complex multi nutrient supplementation containing protein, carbohydrates, amino acids, sodium, potassium, calcium, magnesium, chloride, trace minerals, and fat soluble vitamins had only 15%rate of complications as compared to a 70%complications rate among non-supplemented group (Reid I R *et al*; 2008, Cumming RG *et al*; 1997, Knapen, MHJ *et al*; 1989).

In various studies it has also been established that Non-steroidal anti- inflammatory drugs and Cox-2 inhibitor drugs impaired fracture healing (Nwadinigwe, CU *et al*; 2007, Murnaghan M *et al*; 2006). In experimental studies on rat, excessive alcohol consumption has been shown to retard fracture healing. (Tonnesen, H *et al*; l 1991, Chakkalakal, D.A *et al*; 2005)

In this study we set out to document the prevalence of calcium mono-therapy supplements use among patients being managed for bone fractures in our center. It is a hospital based prospective study.

*Corresponding author: **Olakulehin O.A***
Surgery Department LAUTECH Teaching Hospital Ogbomoso Oyo State. Nigeria

MATERIAL AND METHODOLOGY

We designed a pro forma, which was pre tested on 10 participants. We administered the questionnaire on 101 consecutive patients either at the surgical out-patient or on admission in the hospital. Information that were extracted included the bio data, level of education, whether the patient was being treated on out-patient basis or hospitalized, the specific bone or bones that was or were fractured, whether the fractured bone was being managed operatively or non-operatively, whether the patient took calcium supplement or not, the source of the prescription or over the counter procurement, and knowledge of possible side effect[s] or otherwise of using calcium mono-therapy supplement. This study was carried out over a period of three [3] months.
SPSS version 17 was used to analyze the data collected.

RESULTS

Out of the 101 responders, 57.4% (58) were exposed to calcium supplement in one form or the other, of these 58 patients attending physicians accounted for 12.1% (7) of the prescriptions. In other words 88% of those on calcium supplements were taking it on either recommendation of other patients, relatives or other health workers. About two third of those on calcium supplement did not know the brand of calcium supplement that they were on. There were also no uniformity in the dosage of calcium supplements used by various responders.

Table 1 Socio-demographic Characteristics of Respondents (N = 101)

Variable	Frequency	Percentage
Age groups (in years)		
a< 20	6	5.9
20 – 29	35	34.7
30 – 39	27	26.7
40 – 49	16	15.8
≥ 50	17	16.8
Mean age	36.4 ± 14.0 years	
Sex		
Male	64	63.4
Female	37	36.6
Level of Education		
None	9	8.9
Primary	12	11.9
Secondary	32	31.7
Post-secondary	48	47.5

Table 2 Nature of fracture, bone fractured and type of patient care among Respondents (N = 101)

Variable	Frequency	Percentage
Nature of fracture		
Traumatic	92	91.1
Pathological	8	7.9
Stress	1	1.0
Bone fractured		
Spine	7	6.9
Humerus	15	14.9
Radius & Ulna	9	8.9
Hip	11	10.9
Femur	17	16.8
Tibia	20	19.8
Ankle	14	13.9
Pelvis	8	7.9
Type of patient care		
In-patient	38	37.6
Out-patient	63	62.4

More than two thirds of the responders believed that Calcium supplements promotes healing and that it is necessary for bone healing.

Table 3 Calcium usage in the course of current treatment among the Respondents (N = 101)

Variable	Frequency	Percentage
Had calcium in the course of current treatment		
Yes	58	57.4
No	43	42.6
Calcium recommended by		
Other patients	12	20.7
Nurses	11	19.0
Relatives/Neighbours	8	13.8
Self	7	12.1
Doctors	7	12.1
Plaster of Paris technician	6	10.3
Other hospital staff	4	6.9
Physiotherapists	3	5.2
Length of time on calcium		
1 – 4 weeks	27	46.6
> 4 weeks	31	53.4
Mean time	4.9 ± 2.6 weeks	
Brand name of calcium		
CAC	25	43.1
Not known	33	56.9
Number of tablets per day		
1	11	19.0
2	23	39.7
3	24	41.4
Money spent on calcium weekly (in naira)		
≤ 500	9	15.5
501 – 1000	25	43.1
1001 – 1500	9	15.5
> 1500	15	25.9
Mean cost	1,194 ± 612.0 naira	

Table 4 Perception of the Respondents about Calcium usage (N = 101)

Variable	Frequency	Percentage
Calcium promotes bone healing		
Agree	78	77.2
Not sure	22	21.8
Disagree	1	1.0
Need to consult my doctor on calcium usage		
Agree	43	42.6
Not sure	45	44.6
Disagree	13	12.9
Daily calcium is necessary for normal bone growth		
Agree	61	60.4
Not sure	40	39.6
Perception about Calcium usage		
Good	55	54.5
Poor	46	45.5

Males were 2.52 times more likely to use calcium than females, in-patients were 4.69 times more likely to use calcium than out-patients and those with poor perception about calcium usage were 10.56 times more likely to use calcium than those with good perception.

The age of the patient, level of education and nature of the fracture were not significant determinant factors as to whether the patient used calcium supplement or not in the course of his care.

Table 5 Factors associated with Calcium Usage among the Respondents (N = 101)

Variable	Calcium usage		df	X^2	p-value
	Yes (%)	No (%)			
Age groups (in years)					
< 20	2 (33.3)	4 (66.7)			
20 – 29	17 (48.6)	18 (51.4)			
30 – 39	17 (63.0)	10 (37.0)	4	4.1	0.394 Not significant
40 – 49	11 (68.8)	5 (31.2)			
≥ 50	11 (64.7)	6 (35.3)			
Sex					
Male	42 (65.6)	22 (34.4)	1	4.8	0.028 Significant
Female	16 (43.2)	21 (56.8)			
Level of Education					
None	5 (55.6)	4 (44.4)	3	1.8	0.625 Not significant
Primary	5 (41.7)	7 (58.3)			
Secondary	18 (56.2)	14 (43.8)			
Post-secondary	30 (62.5)	18 (37.5)			
Type of patient care					
In-patient	30 (78.9)	8 (21.1)	1	11.5	0.001 Significant
Out-patient	28 (44.4)	35 (55.6)			
Nature of the fracture					
Traumatic	52 (56.5)	40 (43.5)			
Pathologic	6 (75.0)	2 (25.0)	2	2.4	0.303 Not significant
Stress	0 (0.0)	1 (100.0)			
Perception about Calcium usage					
Good	19 (34.5)	36 (65.5)			< 0.0001 Significant
Poor	39 (84.8)	7 (15.2)			

Table 6 Logistic regression analysis (N = 101)

Variables	Odds Ratio	95% Confidence Interval
Sex		
Male	2.52	1.01 – 6.27
Female (R)		
Type of patient care		
In-patient	4.69	1.71 – 13.20
Out-patient (R)		
Perception about Calcium usage		
Poor	10.56	3.63 – 31.91
Good (R)		

R – Reference variable.

DISCUSSION

Calcium is one of the most important minerals in the bone in conjunction with the phosphorous and to a lesser extent magnesium. More than 90% of the total body calcium is in the bone. Beside bone mineralization, calcium is essential for normal cell function, nerve conduction and muscle contraction. Serum level is critically maintained between 2.2-2.6mmol/l. The recommended daily intake of calcium is 20-25mmol.

Normal serum calcium level is essential for bone healing, and the dietary supply is often adequate. Unusual high serum calcium level has been shown to have deleterious effect on bone healing, increased incident of stroke, myocardial infarction and sudden death. (Bolland *et al*; 2008, Hsia J *et al*; 2007)

As calcium absorption is dependent on Vitamin D, these nutrients work synergistically. Human studies, in fact suggest that for best fracture healing both calcium and Vitamin D should be obtained in daily optimum daily levels(Doetsch, A *et al*; 2004, Gigante, A et el; 2008)

Most of the patients consume plenty of phosphorous which is quite high in processed food and colas

However the elderly, dieter, and those on low protein diets often do not consume enough phosphorous to meet the needs of new bone formation. (Heaney, RP and Nordin, BEC. 2002)

It has also been known that bioactive silicon plays an important role in bone collagen syntheses. A 2005 human study found bioactive silicon to enhance the effects of calcium and vitamin D3 on new bone formation. (Spector TD; *et al*. 2005)

A small Turkish rat study showed that vitamin C supplementation accelerated the fracture healing process. (Yilmaz, C, *et al*; 2001)

Spanish study also documented that rats with higher vitamin C blood levels developed a stronger fracture callus than those with low blood levels. (Alcantra- Martos, T, *et al*; 2007)

Low vitamin D levels led to suboptimal fracture healing and the administration of vitamin D accelerated initial fracture callus mineralization.16 Vitamin D in conjunction with vitamin K, stimulates the transformation of fracture site stem cells to bone building osteoblasts. Vitamin D status is an independent predictor of functional recovery after hip fractures. (Di Monaco, M, *et al*; 2005)

Vitamin K helps conserve calcium by reducing the loss of calcium in the urine. In various studies it has also been established that Non-steroidal anti- inflammatory drugs and cox 2 inhibitor drugs impaired fracture healing (Nwadinigwe, CU *et al*; 2007, Murnaghan M *et al*; 2006). Alcohol impairs bone healing and increases the risk of infection and re-fracture (Tonnesen, H *et al* 1991, Chakkalakal, D.A *et al*; 2005)

Fractures healed better when placed on multi nutrient supplements which include calcium, phosphate, magnesium, complex carbohydrate, vitamin c, vitamin B complex, protein, fat soluble vitamins, sodium, potassium and trace elements. (Cumming, RG *et al* 1997, Reid IR *et al*; 2008, Kakar, S and Einhorn, T.A.2004)

Calcium supplement medications are over the counter drugs in Nigeria, which has made it a susceptible to misuse among fracture patients.

More than half of the patients under study were on calcium supplements, and only 7% of these were prescribed by the attending physician. Nearly two third of the patients in this study believe that calcium is necessary for bone health but were oblivious of the inherent danger in calcium mono therapy supplement**.**

While much is known about calcium by the patients and other health workers and the patients, converse is the case with other supplements that are needed for optimal bone healing if need be.

There is a need to improve on patient education and the necessity of well stated policy on the comprehensive supplement needs of fracture patients.

References

Alcantra- Martos, T, Degado-Martinez, D, Vega, MV, Carrascal, MT and Munuera-Martinez, L. 2007. Effects of vitamin C on fracture healing in elderly Osteogenic disorder Shonogi rats, J Bone Joint Surg Br, 89-B(3):402-407.

Bolland MJ, Barber PA, Doughty RN, Mason B, Horne A, Ames R, Gamble GD, Grey A, Reid IR. 2008: Vascular events in healthy older women receiving calcium supplementation: randomized controlled trial. BMJ 336:262-266.

Chakkalakal, DA, Novak, JR, Fritz, ED, Mollner, TJ, Mc Vicker, DL, Garvin, KL, Mc Gurie, MIH, and Donohue, TM.2005. Inhibitor of bone repair ina rat model for chronic and excessive alcohol consumption, Alcohol, 36(3):201-214.

Copp, DH and Greeberg, DM.1945. Studies on bone fracture healing: Effects of Vitamins A and D, Jr of Nutr, 29(4):261-267.

Cumming RG, Cumming SR, Nevitt MG, Scott J, Ensrud KE, Vogt TM, fox K. 1997: Calcium intake and fracture risk: Results from the study of osteoportic fractures. Am.J Epidemiol 145:926-934.

Di Monaco, M, Vallero, F, Di Monaco, R, Mautino, F, and Cavanna, A.2005. Serum levels of 25-hydroxyvitamin D and functional recovery after hip fracture. Arch Phys Med Rehabil, 86(1):64-68.

Doetssch; A *et al*. 2004. The effects of calcium and Vitamin D3 Supplementation on the healing of the proximal humerous fractures: A randomized placebo- control study, Calcified Tissue Internal, 75(3), 75(3):183-188.

Gigante, A, Torcianti, M, Boldrini, E, Manzotti, S, Falcone, G, Greco, F, and Mattioli-Belmonte, M.2008. Vitamin K and D association stimulates in vitro osteoblast differentiation of fracture site derived human mesenchymal stem cells, J Bil Regul Homeost Agents, 22(1):35-44.

Heaney, RP and Nordin, BEC. 2002. Calcium effects on phosphorous absorbtion: implications for the prevention and co therapy of osteoporosis, J Am Coll Nutr, 21(3):239-244.

Hsia J, Heiss G, Ren H, Allison M, Doan NC, Greenland P, Heckbert Sr, Johnson KC, Manson JE, Sidney S,Trevisian M. 2007: Calcium/Vitamin D supplementation and Cardiovascular events. Circulation 115:846-854.

Kakar, S and Einhorn, T.A.2004. Importance of Nutrition in fracture healing, In Nutrition and Bone Health, ed. Holick, MF and Dawson-Hughes, B, Totowa, NJ: Human Press, Inc.

Key JA, Odell RT.1955. Failure of excess minerals in diet to accelerate the healing of experimental fractures. J Bone Joint Surg; 37A:37.

Knapen, MHJ, Hamulyak, K and Vermeer, C. 1989. The effect of Vitamin K supplementation on circulating ostocalcin (bone Gla protein) and urinary calcium excretion, Ann Inter Med, 111: 1001-1005.

Nwadinigwe, CU and Anyachie, UE. 2007. Effects of cyclooxygenase inhibitors on bone and cartilage metabolism- A review, Niger J Med, 16(4):290-294

Murnaghan, M Li, G, and Marsh, DR. 2006.Nonsteroidal anti-inflammatory drug-induced fracture nonunion: An inhibition of angiogenesis?, j Bone Joint Surg Am, 88 Suppl #:140-147.

Reid IR, Bolland MJ, Grey A. 2008. Effect of Calcium supplementation on hip fractures. Osteoporosis Int 19:1119-1123.

Spector TD; *et al*. 2005. Effect on bone turnover and BMD low dose oral silicon as an adjunct to calcium/Vitamin D3 in a randomized placebo-controlled trial. Abstrct from the ASBMR 27th Annual Meeting,Nashville, TN.

Tonnesen, H, Pedersen, A, Jensen, MR, Moller, A, and Madsen, JC. 1991. Ankle fractures and alcoholism: The influence of alcoholism on morbidity after malleolar fractures, J Bone Joint Surg Br, 73(3):511-513.

Yilmaz, C, Erdemli, E, Selek, H, Arikan, M, and Erddemil, B. 2001. The contribution of Vitamin C to healing of experimental fractures, Archives of Orthpaedic and Trauma Surgery, 121(7):426-428.

****

How to cite this article:

Olakulehin O.A *et al*. 2016, Calcium Mono-Therapy Supplement Use Among Patients Treated For Bone Fractures In A Tertiary Hospital, Southwest Nigeria. *Int J Recent Sci Res.* 7(6), pp. 11459-11462.

TSSN 0976-3031