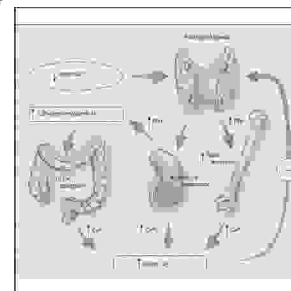


ORIGINAL

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LOW SERUM CALCIUM ASSOCIATED WITH TUBERCULOSIS



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ABSTRACT... Design: A prospective study. **Place and Duration of study:** Department of Orthopedic at Liaquat medical college from January 1997 to June 2001 and continued at Dow medical college from Oct 2001 to march 2005. **Patients and Methods:** 33 patients suffering from tuberculosis out of them 22 was female and 11 were male. In this study we are able to pin point the exact nutritional factor responsible for the development of tuberculosis. **Results:** We are able to find that in our all-33 tuberculous patients serum calcium was low. **Conclusion:** We conclude that low serum calcium have definite roll in the development of tuberculosis. Calcium supplements along with Vitamin D should be added for the treatment and prevention of the disease.

Key words: Serum Calcium, Tuberculosis.

INTRODUCTION

Tuberculosis is probably oldest disease known to mankind¹. It is commonly seen in the poor population of developing countries including Pakistan. However, it is still, the growing danger of developed countries among old age group and patients with AIDS². The disease is caused by Mycobacterium tuberculosis. Among predisposing factors poor nutrition, underprivileged living conditions, dark home, offensive hygiene and the low immunity are blamed, along with history of close association with patient of tuberculosis. Which of the

nutritional factor exactly responsible for the nourishment of Mycobacterium tuberculosis in human body still to be recognized? In this present study we able to recognize the exact nutritional factor. That is low serum calcium. Patient with low serum calcium always going to develop tuberculosis provided he or she is living in close contact of other tuberculous patients. The idea flown in my mind during conducting the OPD of patients with tuberculosis of bone and joints always complaining of whole body aches. Forced us to do serum calcium of these patients. When the serum calcium of these patients were

determined. It was surprising for us, that almost all patients with tuberculosis not having additional calcium or vitamin D supplement or not on steroid therapy were having low serum calcium. This accidental finding strained us to collect the data of all our tuberculous patients and shared our sighting to entire medical community. This is amazing that local literature absolutely unvoiced except the free paper of author³ himself about this finding. However our contemporary abroad has already worked on this subject and our finding are matching with their succeed^{4,5}.

MATERIAL AND METHODS

The Study was conducted on adult patients in the Department of Orthopedic surgery unit I at civil Hospital Hyderabad during my posting at Hyderabad from Jan 97 to June 2001 and continued in Civil Hospital Karachi in the department of orthopedic unit I after my arrival at DMC in Oct 2001. Few patients from my private clinic were also included in the study. The study was started in 1997 and continued up to March 2005. The study was based upon the laboratory results of serum calcium of proved tuberculous patients. Patients were labeled tuberculous if they are sputum positive, or their biopsy shows typical tuberculous granuloma or on typical x-ray findings (e.g. T.B spine in which loss of disc space is the typical finding.) and other substantial clinical evidence of tuberculosis including response to antituberculous drugs. All selected patients with proved tuberculosis were evaluated for history, examination hematological tests and radiological assessment.

The Patients were followed for six months to two years both clinically and radio logically. Complication and out come recorded. All data were recorded on a prescribe form, prepared carefully. All selected patients with proved tuberculosis were evaluated for history, examination hematological tests and radiological assessment. All tuberculous patients on steroid therapy or patients who are taking additional calcium and vitamin D supplements in last three months are excluded from our study. Similarly tuberculous patients with diseases known to cause hypercalcaemia e.g. hyperparathyroidism and certain renal diseases were also

excluded from our study.

RESULTS

Total No of patients were 33 with 11 male and 22 female with male female ratio exactly 1:2. Most of the cases were reported in their reproductive age as shown in table.

Age group	Male	Female	Total
0-10 years	1	2	3
11-20 years	3	11	14
21-30 years	5	3	8
31-40 years	1	2	3
41-50 years	1	2	3
Over 50 years	0	2	2
Grand total	11	22	33

Social and economical condition and residential area of all patients was poor. Almost 54.54% of patient was living in semi dark home however about 21.21% of patients having negligible sun light exposure and 68.69% were having partial exposure to sun light.

Around 54.54% of patients the diagnosis was on biopsy. 9.09% of patients were having sputum positive. 36.36% patients were on typical X-ray finding as seen TB spine, however history, examination, laboratory findings and clinical response to anti-tuberculous drugs were all taken in to account before labeling them tuberculous. Majority of our cases belong to spine (60.60%). 9.09% cases from pulmonary tuberculosis. Remaining 30.30% from other part of musculoskeletal system, like left scapulae, wrist, knee, right and left hip, ankle joint, left ulnar head, trochantric bursa, proximal phalanx of 2nd toe. (One case from each side). Among spine, lumbar spine is the most common site to involve where as dorsal spine cervical spine and sacral region is to follow the order.

Table-II. Spinal involvement.			
Site in the spine	Male	Female	Total
Cervical spine	0	2	2
Dorsal spine	1	5	6
Lumber spine	1	10	11
Sacral region and Lt. Inguinal lymph node	0	1	1
Grand total	2	18	20

54.54% were newly diagnosed cases of tuberculosis out of them 39.39% were female. 45.45% were already diagnosed and were on anti-tuberculous therapy. Among these old 45.45% cases 30.30% also female. All old cases were on ATT from several months to 2 years. However none of them old or fresh case were not taking vitamin D and calcium supplemented in their diet, except one male of 18 years of age, who is taking one glass of milk off and on with out proper exposure to sunlight or taking vitamin D supplement. His Ca. level was found relatively better but still low that is 8.4 mg%. Calcium level was below normal in all case. Our normal limit was 8.8 mg% in our series its value varies from 5.0 to 8.4. It is surprising that two of our patients were having serum calcium as low as 5.0 however none of patients in our series complained of tetany.

Serum phosphorus was raised in 42.42% lowered 3.03% and remains normal in 54.54%, out of them 24.24% male and 30.30% were female. Alkaline phosphatase was raised in 63.63% (42.42% female and 21.21% male) it was remain normal in 36.36% of patients. (24.24% female and 12.12% male)

DISCUSSION

Tuberculosis is the disease of people who lived in under privilege condition like dark home and poor nutritional intake especially milk. It is a well-known fact that poor exposure to sunlight results in Vitamin D deficiency that along with low intake of milk leading to hypocalcaemia. Low serum calcium does not considered the predisposing cause of tuberculosis until the recent past,

where different workers from different centers of the world are able show that tuberculous patients are often associated with hypocalcaemia^{3,4,5}. Low serum calcium in these patients also associated with vitamin- D deficiency^{6,7,8}. This Vitamin D deficiency in patients with tuberculosis is possibly a cause rather than effect of the disease; deficiency is due to decreased dietary intake. Vitamin D deficiency can occur without any symptoms. If symptoms are present, it indicates severe deficiency. Serum calcium and phosphorus values do not often predict the existence of deficiency^{8,9}. We agree with our contemporary fellows however in our series in all tuberculous patients on steroid therapy or patients, which are taking additional vitamin D, supplements in last three months are excluded from our study. Similarly tuberculous patients with diseases known to cause hypercalcaemia e.g. hyperparathyroidism and certain renal diseases were also excluded. These strict excluding criteria might be the true reflection of disease that all tuberculous patients having hypocalcaemia irrespective site sex and extent of lesion in our series.

Calcium and vitamin D has an important role in the control of tuberculous infection. The ability to kill mycobacterium tuberculosis by macrophages and monocytes is reduced in the absence or in the deficiency of extra cellular and intra-extra cellular calcium^{10,11}. Similarly Vitamin D deficiency is associated with an increased risk for tuberculosis infection. Studies using in vitro systems indicate that 1,25-dihydroxyvitamin D (3) [i.e. 1,25(OH)(2) D (3)], the most active form of the vitamin, enhances mycobacterium killing by increasing nitric oxide (NO) production, a potent anti-microbial mechanism of activated macrophages, and suggest that 1,25(OH) 2D3 also limits host damage^{6,7}.

Clinically it is also observed patient with proved tuberculosis does not respond to antituberculous therapy until vitamin D is added⁹. We differ in this respect that calcium supplement must be add along with vitamin D to get excellent clinical response to antituberculous therapy, as this is been continuously observed in our series as well.

CONCLUSIONS

We conclude that low serum calcium have definite role in the development of tuberculosis. The current literature also supported our finding furthermore; it says that vitamin D has a direct role in killing of mycobacterium tuberculosis apart through elevation of serum calcium. Therefore we advocate Calcium supplements along with Vitamin D should be added for the treatment and prevention of the disease.

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