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CALCIUM, PHOSPHORUS AND MAGNESIUM LEVELS IN PATIENTS WITH PSORIASIS, ATTENDING KHARTOUM TEACHING HOSPITAL FOR DERMATOLOGY AND VENEREAL DISEASES

Eldirdiri Ishag Ali[1] and Abdelkharim A. Abdrabo[2]*

[1]Department of Clinical Chemistry, [2]Head department of Clinical Chemistry,
Faculty of Medical laboratory sciences, Al –Neelain University, Sudan.

ABSTRACT

Psoriasis is an inflammatory dermatosis that is characterized with hyper proliferation of keratinocytes and inflammatory infiltration in the epidermis and dermis. Evidences is now accumulating that there is an association between Calcium, Phosphorus, Magnesium and Psoriasis but the detailed mechanisms are not yet known. Low serum Calcium level and high serum phosphorus level has been suggested in the pathogenesis of his phenomenon. In this study we estimate Calcium, Phosphorous and Magnesium values in Psoriatic patients and compare with those of age and sex-matched non Psoriatic controls. **T**he study involved a control group of apparently healthy non-psoriatic as controls (N = 40) matched for age with a test group of psoriatic patients (N = 60). The age range of both groups was 08-65 years. Serum total calcium (Ca^{++}), Phosphorus (PO_4), , and Magnesium (Mg^{++}), concentrations were measured according to the standards. Appropriate statistical tests were used to assess significant difference in the means of the studied concentrations between patients and the control group. The psoriatic patients showed significantly lower $T.Ca^{++}$ (M±SD=8.29±0.72mg/dl) , Significantly higher $T.PO_4$ (M±SD=4.5±0.40mg/dl) level compared to non- psoriatic (M±SD=9.96±1.04 mg/dl, M±SD=3.6±0.58 mg/dl respectively $P<0.05$). In contrast there is no significant difference in Psoriatic Mg^{++} level (M±SD=1.39±0.19mg/dl), compared to non-psoriatic (M±SD=1.38±0.17mg/dl).$P>0.05$. In this study we concluded that the decrease in above parameters are the probable causative agent for the pathogenesis of Psoriasis and may be useful to do early screening and mineral treatment to prevent its complications.

Keywords: Psoriasis, Calcium, Phosphorus, Magnesium.

INTRODUCTION

Psoriasis is a chronic inflammatory immune mediated disease that predominantly affects the skin and joint [1], that affect 1-2% of population [2]. Global prevalence of psoriasis, is about 2–4.8% [3]. Psoriasis was originally thought to be an inflammatory disorder solely affecting the skin, but it is now recognized as a systemic inflammatory disease, much like systemic lupus erythematosus (SLE) and rheumatoid arthritis (RA) [4]. The major manifestation of psoriasis is chronic inflammation of skin. Is characterized by disfiguring, scaling and erythematous plaques that is may be pain full or often severely pruritic and may cause significant quality of life issue. According to various research groups there is still no single concept that explains the etiology of psoriatic features [5]. Evidences is now accumulating that there is association between environmental factors, vitamin C, vitamin E, Calcium, Phosphorous, Magnesium metabolic disturbances and psoriasis disease, but the detailed mechanism are not yet known. Hypocalcaemia is a triggering factor for the development of psoriasis. Decreased intracellular calcium triggers the alteration and differentiation and proliferation of keratinocytes [6].

Corresponding Author: - **AbdElkarim A. Abdrabo** Email: abdrabokarim@hotmail.com

Phosphate is needed for bone mineralization and cellular structural components (e.g. phospholipids, nucleotides, phosphoproteins), for energy storage as ATP, for oxygen transport (in red blood cell 2,3-DPG) and for acid base balance (as a cellular and urinary buffer) [7,8]. Magnesium is primarily an intracellular ion that acts as a metallo-coenzyme in over 300 phosphate transfer reactions. It participates in all reactions involving the formation and utilization of ATP and thus has a critical role in the transfer, storage and utilization of energy within the body.

Data is scarce regarding prevalence and incidence of psoriasis in our country (Sudan) but it is assumed (on basis of daily out-patients department attendance) to be a common problem.

Hence, the aim of present study was to determine common minerals in psoriasis Sudanese patients and further to establish its role in the pathology of the disease.

PATIENTS AND METHODS

During the period from September 2013 to May 2014 at Khartoum Teaching Hospital for Dermatology and Venereal Diseases-Khartoum-Sudan, a total of 60 (30 male and 30 female) patients with psoriasis were selected and included in the study. 40 Healthy age and sex matched volunteers were used as controls. All patients with various grades of severity were included in study. The patients were divided into three groups according to rule of nine to determine this percentage of severity, Patients with less than 30% body involvement were graded as mild, 30-50% as moderate and those having more than 50% involvement of body surface as severe. Patients and controls were excluded from study if there was evidence of renal, hepatic or thyroid dysfunctions. All the patients and controls under treatment with drug that may contribute to change in calcium, Phosphorus and magnesium homeostasis were excluded. All the parameters were estimated in serum. The estimation tests of serum Calcium, Phosphorus and magnesium were done on BioSystem A25 chemistry analyzer (Barcelona-Spain).

Statistical Analysis: Statistical evaluation was performed using the Microsoft Office Excel (Microsoft Office Excel for windows; 2007) and SPSS (SPSS for windows version20).

Independent-samples T test was used to assess significant difference in the means of the studied variables in patients and control.

RESULTS

The study included a total of 100 participants. Among them 60 had psoriasis (30 male and 30 female) and 40 were healthy controls (21 male and 19 female). Their ages ranged from 8 to 73 years. All had psoriatic lesions that involved not less than 25% of body surface. The duration of disease ranged between 3 months to 25 years.

In psoriatic patients the total serum calcium were decrease significantly ($p<0.001$) and Inorganic phosphorous was increase significantly ($p<0.001$) while as there was no significant difference in the serum magnesium level as compared to control. Shown in table 1.

Table 1. Estimation of serum Calcium, Phosphorus and magnesium

Parameter	Group (n=100)		P.value
	Patient (n = 60) Mean±SD	Control (n = 40) Mean±SD	
T.Calcium (mg/dl)	8.29±0.72	9.96±1.04	< 0.001
Phosphorus (mg/dl)	4.5±0.40	3.57±0.58	< 0.001
Magnesium (mg/dl)	1.39±0.19	1.38 ± 0.17	> 0.05

P value <0.001=very highly significant.
P value >0.05=no relation.

DISCUSSION

Numerous biochemical, immunological, genetic and recently free radical generation abnormalities responsible for the pathogenesis of psoriasis, that exact pathogenesis of psoriasis has remained unclear, but some factors are known to trigger, participate or aggravate the disease process. Several studies have approved the close relation between psoriasis and serum calcium level. The researches demonstrated that hypo calcaemia resulting from psoriasis intensifies following parathyrodoctomy such that psoriasis intensification and atopic dermatitis have been introduced as manifestations of hypo parathyrodism [9]. On the other hand hypocalcaemia may lead to developing to kinds of generalized pustular Psoriasis [10]. It should be remembered that intracellular calcium is kept in mitochondria, reticulum sarcoplasmic and reticulum endoplasmic. Activating cell cytoplasmic membrane receptors lead to rerelease of calcium in cytosol. If concentration of the free intracellular calcium decreases, it will either actively release from free intracellular resources or enter the cell actively and through adenosine triphosphatase [11]. Calcium within the cell plays an important role in the Regulation of proliferation and differentiation of keratinocytes. Calcium homeostasis may be involved in the development or exacerbation of psoriasis because hypocalcaemia may damage cell adhesion molecule such as cadherins which

dependant on calcium [12]. According to the researches, there are several evidences regarding involvement of nucleotide in pathogenesis of psoriasis such that decrease of circular adenosine monophosphate result in increase of cellular proliferation [13]. It seems that increase of phosphorylase kinase activity involving adenosine triphosphate metabolism result in psoriasis intensification .It can be attributed to calcium and phosphorus metabolism changes [14]. According to the results of our present study the calcium levels were significantly decrease along with increase in the phosphate level in patients suffering from psoriasis.

Magnesium compounds in combination with sun rays radiation may effectively manage skin conditions like psoriasis and atopic dermatitis, according to a study published in October 2000 issue of" The Journal of Investigative Dermatology. The researchers found that magnesium compounds from the Dead Sea positively influences certain cells in the skin that are involved in inflammation and production of psoriatic lesions. In the present study there is no change in magnesium level in patients with psoriatic disease.

CONCLUSION

This study shows an increased prevalence of minerals abnormalities in Sudanese with psoriasis. Hence, is recommended early screening and treatment of minerals disturbances specially calcium and phosphorus because of essentials for a good health.

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