Research Article

# A biochemical study on scenario of extracellular sodium and potassium in patients with psoriasis-Altered membrane permeability to potassium

M Jansirani Sivasubramanian[1*], R Hemavathi Baskar[2], Abirami Soundarajan[3], A Bunaratchagan[4]

{[1]Professor, Department of Biochemistry} {[4]Assistant Professor, Department of Dermatology}
Sri Lakshmi Narayana institute of Medical Sciences,Puducherry-605502, INDIA.
[2]Assistant Professor, Department of Physiology, Vellore Medical College, Vellore District. Tamil Nadu, INDIA.
[3]Department of Anesthesialogy, Madras Medical College, Chennai, Tamil Nadu, INDIA.
**Email:** onenessjrs29@gmail.com

## Abstract

**Objective**: To quanitate the serum sodium and potassium in patients with psoriasis and to identify the probable cause of hyperkalemia in psoriasis. **Introduction:** The pathologic process is likely due to dysregulation of activated T-cell interactions with antigen presenting cells and overproduction of inflammatory cytokines such as interferon-α and tumor necrosis factor-alpha. **Methodology**: 24 psoriatic patients on first presentation at dermatology OPD were included in this small pilot study. The blood samples were analysed for the serum electrolytes namely sodium and potassium were analysed by the Ion selective electrode method adopted in the automated computerised electrolyte analyser. Any other disorders which also lead to hyperkalemia were not considered **Results and Discussion:** The obtained data was analysed by student 't' test. Sodium ($P< 0.001$) and Potassium ($P< 0.001$) were statistically significant. This present study shows that, there was significant elevation of potassium ion in patients with psoriasis. This suggests that it might due to the Na/K ATPase pump activity**. Conclusion**: Alteration in the activity of $Na^+$ and $K^+$ pump or Na-K-co transport might be the cause which needs further study.

**Keywords:** Psoriasis, hyperkalemia, sodium, potassium, membrane permeability, Na-K ATPase.

[*]**Address for Correspondence:**
Dr. M Jansirani Sivasubramanan, Department of Biochemistry, Sri Lakshmi Narayanaa Institute of Medical Sciences, Puducherry-605502, INDIA.
**Email:** onenessjrs29@gmail.com

Received Date: 26/05/2015 Revised Date: 08/06/2015 Accepted Date: 10/05/2015

Access this article online

Quick Response Code:

Website: www.statperson.com

DOI: 11 June 2015

## INTRODUCTION

Psoriasis is a membrane disorder. This is a common papulosquamous skin disease and may be associated with spondyloarthropathy. Etiology of psoriasis is unknown. it affects 2% of US population. This may begin at any age but mean age onset is 30yrs.Both the sexes are usually affected equally. There are different types of psoriasis-(5types) depending on the variations morphology and site of distribution. According to morphology it is categorized into chronic psoriasis, guttae psoriasis, annular/linear/follicular psoriasis, erythroderma, psoriatic arthropathy and pustular psoriasis. According to distribution it is divided into psoriasis vulgaris (extensors), flexural psoriasis, sebo psoriasis, palmo plantar psoriasis and psoriasis unguis[1], the form that psoriasis takes in patients which depends on a combination of genetic influence environmental factors, associated diseases infections and drugs namely lithium, antimalarials, beta - adrenergic blockers, interferon, ethanol (if abused ) are reported to induce psoriasis. The pathophysiology of lesions is the results of inflammation in the dermis and hyperproliferation with abnormal differentitation of the epidermis. The pathologic process is likely due to dysregulation of activated T- cell interactions with antigen presenting cells and overproduction of proinflammatory cytokines such as

How to site this article: M Jansirani Sivasubramanian, R Hemavathi Baskar, Abirami Soundarajan, A biochemical study on scenario of extracellular sodium and potassium in patients with psoriasis-Altered membrane permeability to potassium. *International Journal of Recent Trends in Science and Technology* June 2015; 15(2): 310-312 http://www.statperson.com (accessed 12 June 2015).

interferon- alpha and tumor necrosis factor-alpha.[2] There are different types of psoriasis one such is the palmar plantar plaque psoriasis. In palmo plantar pustulosis (ppp) is a chronic inflammatory condtion characterised by crops of sterile pustules on the palms and soles, which erupts repeatedly over time[3]. It also occurs with erythmatous keratotic lesions which tends to crack, causing bleeding and pain.[4,5]. International psoriasis council, which is conducted in the year 2007, considered the palmoplantar plaque psoriasis (ppp) as one of the entity which is associated with plaque psoriasis in about 20% case[6]

## MATERIAL AND METHOD

24 patients of both sexes the female and male aged between 40-70yrs were selected from the OPD, dermatology department of Sri Lakshmi Narayanaa Institute of Medical sciences. Pondicherry, which is a small pilot study. The blood samples (un haemolysed) of the psoriatic patients were analysed for the serum electrolytes viz sodium and potassium following the aseptic precautions in the clinical laboratory. The samples were analysed by Ion selective electrodes method adopted in the automated computerised electrolyte analyser[7]. Psoriatic patients on first presentation at the opd, the serum electrolytes were estimated. Any other disorders which also leads to hyperkalemia are not considered.

## RESULTS AND DISCUSSION

The obtained data's were analysed by student 't' test Sodium ($P<0.001$) and Potassium are statistically significant ($P<0.001$)There are documental evidences available to show that there are abnormal membrane changes in psoriasis. This present study shows that there is significant elevation of potassium ion in patients with psoriasis irrespective of gender and age, suggests that it might be due to the Na/K ATPase pump activity. It is well known fact that k+ ion is intracellular and sodium is extracellular ion by nature,[8] Both the cations are kept in balance by the presence of the enzyme Na/k ATPase[9]. In this preliminary study, since it is a membrane disorder there is hyperkalemia and normal sodium which might be due to the selective permeability to k+ ion of the cell membrane. Earlier studies have[10] shown that in psoriasis it is evident that a significant increase in intracellular k+ content, in the maximal velocity of K/Na/ ATPase Na-k-cl cotransport as well as the outward passive permeability for sodium is present. In the present study the increase of k+ ions might be due to the selective inward, as well as outward membrane permeability to Na might be compensated for by increased activities of Na-k-pump and outward Na-k-cl cotransports with secondary increase of k+. There are drugs (iatrogenic and therapeutic agents) which causes hyperkalema in psoriasis, one such is the use of indomethacin in psoriasis[11] hyperkalemia is by inhibiting the prostaglandin synthesis and affects kidneys, in turn by inhibiting the prostaglandin synthesis, the rennin secretion is decreased and contributes hyperkalemia which is due to the hyporeninemic hypoaldosteronism mechanism[12]. However in this small group study there is stastical significant normal sodium concentration and elevated k+ ion. The increase of k+ ion may due to the alteration in selective permeability of the ion (na"andk).Na-k ATPase Na-k-cotranport are to be studied to substantiate these findings in more number of cases.

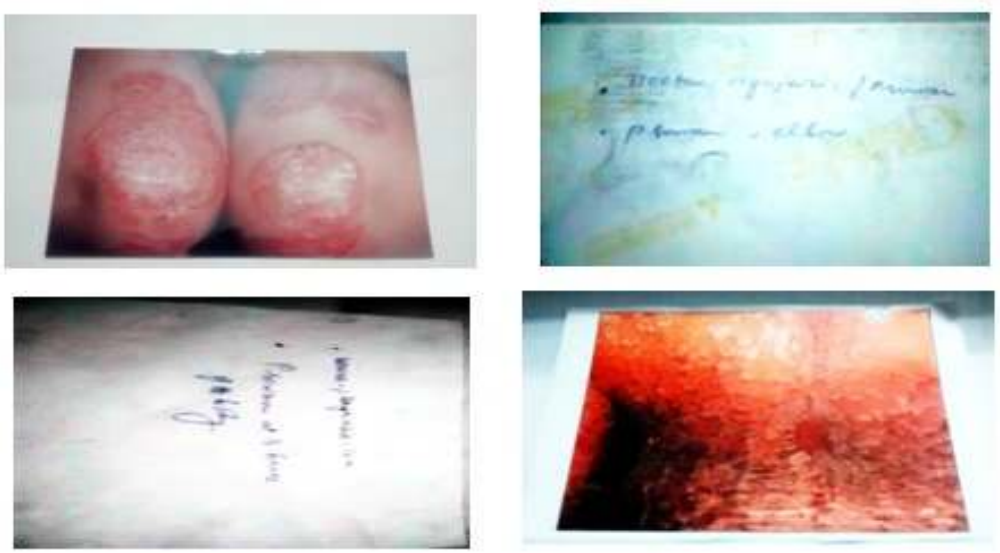

Figure 1

## CONCLUSION

It is concluded that since it is pilot study but quiet interesting to observe this change, and this alteration in transport of the activity of $Na^+$ and $K^+$ pump or Na-$k^+$-$cl^-$ in the cell membrane may be the cause which needs further study. Use of RBC membrane associated activities including Na-k ATPase and other parameters which can highlight the presence of increased oxidative stress (since RBC is exposed to high $po_2$) would b e taken up for further study.

## REFERENCES


1. Asit mithral, Anubhav. Garg., IADVL'S- Concise text book of Dermatology, 1rst edition, page no :202-205.
2. Mark Lebwohl, MD, SquadAli MD, Treatment of psoriasis part -2.systemic therapies. j Am Acads dermatology.45:2001:649-661.
3. K.Danielsen,etal,Is the prevalence of psoriasis increasing ? A 30-year follow –up of a population –based cohort.British journal of dermatology.-(2013) 168, pp13303-1310.(selected articles –in wiley journals p. No 16)
4. Hellgren L, Mobacken H. Pustulosis Palmaris et plantaris, prevalence, clinical observations and prognosis, Acta Derm Venerol 1971;51:284-8.
5. De Waal AC, van de kerkhof pc. Pustules palmo plantaris is a disease distinct from psoriasis. Dermatolog Treat 2011: 22:102-5.
6. Griffiths CE, Chrisopherrs E, Barker JN et al, A classification of psoriasis vulgaris accordingto phenotype. Br J Dermatol 2007:156:258-62.
7. Mitchell scott, et al. Electrolytes and blood gases. Tietz fundamentals of clinical chemistry 6th edition.p.434.
8. Robert murray et al. Biochemstry of extracellular and intracellular communicaton, membranes structure and function. Harper's illustrated biochemistry-26th editon.416.
9. Robert murray et al. Biochemstry of extracellular and intracellular communicaton, membranes structure and function.Harper's illustrated biochemistry-26th editon p.428.
10. Red blood cell membrane cation transport in normo tensive psoratics. Acta derm venerology suppl (stoch).1989.146:457.
11. Elesvier MM et al. Combination of analgesic involvement in the pathogenesis of analgesic nepthropathy. The European perspective. Arch intern med.1981:141:345-357.
12. Hayrieye sayarlioglu.MD et al. Hyperkalemia occurring in a patients with psoratic arthritis following Indomethacin use. The journal of Applied Research.vol:no 2:2005:295-298.


Source of Support: None Declared
Conflict of Interest: None Declared