Role Of Gene Polymorphism in Epidemiology and Disease Trajectory of Psoriatic Patient

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Abstract

Background Psoriasis is a common chronic inflammatory disease of the skin and joints. It can manifest itself as various phenotypes. It is a systemic, inflammatory disease in which an increased release of pro-inflammatory cytokines from immune-related cells and chronic activation of the innate and adaptive immune system causes longterm damage to multiple tissues and organs. It has been associated with numerous comorbidities including rheumatological , cardiovascular and psychiatric complications.

Special attention should be given to the genetic aspect in the pathogenesis of the psoriasis.

Keywords: Psoriasis, Cytokines, Comorbidities,Inflammatory,Genetic

Introduction

Psoriasis is an immune-mediated polygenic skin disorder, various environmental triggering factors, e.g. trauma, infections, medications, may elicit disease in predisposed individuals (1).

It is a lifelong disease with spontaneous remissions and exacerbations and characterized clinically by sharply demarcated dull red scaly plaques affecting mainly the extensor prominences, scalp, and the sites of trauma. While the disease has several distinct yet overlapping phenotypes, by far the most common is chronic plaque psoriasis which affects about 90% of patients (2).

Characteristic histopathological findings include uniform elongation of the rete ridges, dilated blood vessels, thinning of the suprapapillary plate, intermittent parakeratosis, the presence of occasional neutrophil aggregates in the epidermis, and perivascular infiltration of lymphocyte (3).

Psoriasis is a bi-modally distributed disease with one major age of onset at 20–30 years of age as well as a later smaller peak of onset at 50–60 years.It affects both males and females, with earlier onset in females and those with a family history (4).

A higher incidence of psoriasis within families has been reported worldwide. In twin studies, monozygotic twins have a susceptibility to psoriasis that is 2–3 times higher than that of double zygotic twins. Children have a 20% chance of developing psoriasis if one parent is affected and 65% if both parents are affected (5).

A total of 36 genes are thought to account for 22% of psoriasis heritability, and more than 16 genetic loci have confirmed association with psoriasis susceptibility. HLA-Cw6 on chromosome 6 is considered to be the risk variant in the PSOR1 Review of literature 5 susceptibility locus that confers the greatest risk of early onset psoriasis (6).

Aim of the Work

The aims of this work are to:

Detect the assosiation between psoriasis and gene polymorphism and its effect on disease trajectory.

Subjects and Methods

Type of study

Case research with a "control" group.

Subjects

This 40 participants were selected from the outpatient clinic at Benha University's Department of Dermatology, Venereology, and Andrology. There were two distinct sets of subjects: ten people who seemed to be in good health as "control group" in this study and thirty psoriatic patients as patient group.

Thoughts about ethics

The Benha Faculty of Medicine's local ethics committee provided their stamp of approval to the project. Each person who took part in the research first provided their informed permission.

Criteria for exclusion:

No participant was be included in the research if they have any of the following:

Significant medical illnesses occurring at the same time, such as cancer, or heart disease.

Systemic or skin illness characterised by immune suppression or infection.

Methods

The following applies to all patients:

Comprehensive research of full history :

Personal history: name, age, sex, residence, occupation, marital status, special habits (smoking, alcohol).

Psoriasis history: onset, course, duration of illness, history of previous treatment for psoriasis.

Past history of systemic diseases, other skin diseases and drug intake.
Family history of psoriasis.
Physical Checkup:
Full physical to rule any other systemic conditions: general examination including :weight (in kilograms) , height (in meters) and body mass index. BMI (kg/m2) = Weight (in kilograms) / square height (in meters)
A full skin inspection and a clinical evaluation of the psoriatic lesion were performed to find out type and severity of disease.

Statistical methods

The data will be entered into a statistics software programme for the social sciences, where appropriate statistical tests will be run on the compiled data (SPSS).

Results

Table 1: Disease trajectory in the studied patients

Disease trajectory		
Onset		
Gradual	n (%)	26 (86.7)
Sudden	n (%)	4 (13.3)
Course		
R & E	n (%)	16 (53.3)
Progressive	n (%)	14 (43.3)
Duration (year)	n (%)	4 (0.08 - 12)

n: Number; %: Percentage; R & E: Remitting and Erupting

The onset of the disease was predominantly gradual, occurring in 26 patients (86.7%), while a sudden onset was reported by 4 patients (13.3%). The course of the disease varied, with 16 patients (53.3%) experiencing a relapsing and remitting course and 14 patients (43.3%) exhibiting a progressive course. The disease duration among the patients ranged from 0.08 to 12 years, with a mean duration of 4 years.

Discussion

About 70% of disease susceptibility is attributable to genetic factors, with the remaining 30% influenced by environmental factors.Variable candidate genes that may be involved in the etiopathogenesis of psoriasis were outlined by several studies (7).

The gene is composed of coding part (exon) and non-coding part (intron), each gene is separated from the other by spacer which is non coding. Introns consist of large stretches of DNA whose biological functions are only beginning to be elucidated. All genes begin with exons , but most have a variable number of introns within them that alternate with the exons (8).

The coding regions determine primarily amino acid sequences of protein for which they code, and also determine degree of expression of the gene in any tissue at any time. Most genes are present as a single DNA copy, located specifically in the genome (9).

Polymorphism is a variation in DNA sequence that occurs in a population with a frequency of 1% or higher. In biology, it is a discontinuous genetic variation resulting in the occurrence of several different forms or types of individuals among the members of a single species. A discontinuous genetic variation divides the individuals of a population into two or more sharply distinct forms. The most obvious example of this is the separation of higher organisms into male and female sexes. Another example is the different blood types in humans (10).

More than 30 single nucleotide polymorphisms (SNPs) have been associated to contribute to psoriasis risk but only two gene mutations have been found to independently induce psoriasis (IL36RN and CARD14) by affecting both the skin and immune system (11).

Conclusion

In the context of the strong genetic predisposition of psoriasis, the concept of gene polymorphism may be a new step in of the identification of pathogensis of psoriasis.

1. **Ni X, Lai Y.(2020):** A trigger or an executor of psoriasis?. Journal of Leucocyte Biology;108(2):485-91.
2. **Armstrong AW, Read C.(2020):** Pathophysiology, clinical presentation, and treatment of psoriasis: a review. Jama;323(19):1945-60.
3. **Mihu C, Neag MA, Bocşan IC, Melincovici CS, Vesa ŞC, et al (2021):** Novel concepts in psoriasis: histopathology and markers related to modern treatment approaches. Romanian Journal of Morphology and Embryology;62(4):897.
4. **Parisi R, Iskandar IY, Kontopantelis E, Augustin M, Griffiths CE, et al (2020):** National, regional, and worldwide

epidemiology of psoriasis: systematic analysis and modelling study. bmj;369.
5. **Huang YH, Kuo CF, Huang LH, Hsieh MY.(2019):** Familial aggregation of psoriasis and co-aggregation of autoimmune diseases in affected families. Journal of clinical medicine;8(1):115.
6. **Capon F.(2017):** The Genetic Basis of Psoriasis.Int J Mol Sci; 18(12):2526.
7. **Hamed AM, Naji SM, Youssef ME, Nasr HE, Shams GM.(2023):** Association between inducible nitric oxide synthase-954-G> C and Ex16+ 14-C> T gene polymorphisms and susceptibility to psoriasis and psoriatic arthritis. Egyptian Journal of Dermatology and Venerology;43(2):129-38.
8. **Poverennaya IV, Roytberg MA. (2020):** Spliceosomal introns: features, functions, and evolution.Biochemistry (Moscow);85:725-734.
9. **Liu R, Nikolajczyk BS. (2019):**Tissue immune cells fuel obesity-associated inflammation in adipose tissue and beyond.Front Immunol; 10: 1587.
10. **Davenport L, Devesse L, Court DS, Ballard D.(2023):** Forensic identity SNPs: Characterisation of flanking region variation using massively parallel sequencing. Forensic Science International: Genetics ;64:102847.
11. **Wagner M, Sobczyński M, Wiśniewski A, Matusiak Ł, Kuśnierczyk P et al .(2024):** Polymorphisms in the CD6-ALCAM axis may modulate psoriasis risk and outcomes. Human Immunology;85(3):110797.