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PATIENTS WITH PLAQUE PSORIASIS: MTHFR GENETIC POLYMORPHISM AT CAN THO DERMATO-VENEREOLOGY HOSPITAL

Nguyen Trung Kien, Le Pham Truc Linh, Ha Thi Thao Mai

INTRODUCTION

Psoriasis is one of the chronic, recurrent and common inflammatory skin diseases, affecting 2–3% of the world's total population[1]. The multifaceted nature of psoriasis's effects might encompass systemic complications, such as metabolic disorders and psoriatic joints, as well as local complications like infection and scarring. If cosmetic injections could resolve scarring issues in healthy patients[2], then psoriasis patients must undergo a thorough examination to rule out more serious complications inside the body. In particular, MS was one of the most common and important comorbidities[3]. More and more studies are showing that psoriasis is often associated with MS, such as obesity, hypertension, diabetes mellitus, hyperlipidemia and central obesity.

Both psoriasis and metabolic syndrome had similar pathogenesis, characterized by the same inflammatory factor produced by Th1 interferon production and tumor necrosis factor TNF. Understanding the pathogenesis as well as good screening for metabolic syndrome diseases is the foundation for controlling and treating psoriasis in the direction of individualization and perfection to improve the quality of life for patients[6-8]

Methotrexate (MTX) is an antagonist of the enzyme dihydrofolate reductase. It is used as a first-line systemic immunosuppressive therapy for moderate to severe psoriasis. However, there were significant differences in efficacy and toxicity between individuals. Therefore, several studies had identified pharmacokinetic factors to predict the clinical response of MTX[9]. The MTHFR enzyme is indirectly inhibited by MTX

The association between MTHFR polymorphism and susceptibility to psoriasis had been demonstrated in Caucasians, Turks, and Chinese. A study in China reported that MTHFR C677T was associated with an increased risk of psoriasis[9].

The objective of this study was to determine the prevalence of the MTHFR C677T genotype among plaque psoriasis patients and its correlation with clinical and subclinical characteristics at Can Tho Dermatology Hospital.

MATERIALS AND METHODS

Research subjects

Patients with plaque psoriasis who were examined and treated at Can Tho Hospital of Dermato-Venereology from 2021 to 2023

Inclusion criteria

The patient was diagnosed clinically, specifically the lesion was a scaly erythematous plaque with ≥1 of the following suggestive features: Symmetrical distribution; Face extensors; Auspitz sign; Lesions were clearly limited; Silver white scales

Exclusion criteria

The patient was a pregnant and breastfeeding woman; Patients with other acute or chronic systemic diseases; Psoriasis patients used systemic medications, immunosuppressants, and biological drugs within 6 months before the time of the study

Research methods

Study design

Cross sectional study

Sample size

The estimated sample size was 50 plaque psoriasis patients

Data collection

Patients who met the sampling criteria will be carefully explained the goals and methods of conducting the research and must sign a written consent to participate in the research . After that, the patient's blood was taken for tests

Research content

General characteristics and clinical characteristics of study subjects: Age, gender; Age of onset, disease duration, functional symptoms, lesion location, disease severity according to PASI (mild: PASI<10; moderate: 10≤ PASI <20; severe: PASI≥20), quality of life. Metabolic syndrome was diagnosed according to NCEP ATP III criteria (2001) when 3 of the following 5 factors were present: Fasting glucose ≥100mg/dL (≥5.6mmol/L) or taking hyperglycemic drugs; Blood pressure ≥130/85mmHg or using high blood pressure medication; Triglycerides ≥150mg/dL (≥1.70mmol/L) or were taking medications to increase blood triglycerides; HDL-c<40mg/dL (<1.04mmol/L) in men or <50mg/dL (<1.3mmol/L) in women or being treated with drugs that reduce HDL-c; Central abdominal obesity, defined by waist circumference ≥102cm for men or ≥88cm for women; Characteristics of MTHFR C677T gene polymorphism: there were 3 genotypes: CC, CT and TT respectively

- Body mass index (BMI)
- Psoriasis area and severity index: PASI = 0.1(E+D+I)Ah + 0.2(E+D+I)Au + 0.3(E+D+I)At + 0.4(E+D+I)Al
- Determined disease severity according to PASI
- Assessment of quality of life (DLQI) includes 10 questions
- Testing techniques: venous blood was taken in the morning on an empty stomach (last meal 12 hours apart) to measure triglyceride concentration using an automatic biochemical testing machine Monarch 600 with endpoint measurement with the enzyme hexokinase. To measure glucose concentration, it was calculated using an automatic biochemical tester BT 4500S with endpoint photometry using glucose oxidase and peroxidase enzymes
- DNA separation
- Determined MTHFR C677T allele and genotype using GeneProof MTHFR C677T PCR Kit (Czech)

Data processing method

SPSS 26.0

Results

Recorded the incidence of metabolic syndrome based on NCEP ATP III criteria in patients with plaque psoriasis (47.1%).

General characteristics and clinical characteristics of study subjects

Assessing the severity of the disease according to PASI

Showed that the moderate level group accounted for the highest rate (41.4%), mild level (34.3%), and the lowest level was severe level (24.3%)

Clinical characteristics

Most patients with psoriasis experienced symptoms of itching (85.7%). The most common lesions were on the trunk (77.1%), scalp and limbs (75.7%), nails (62.9%), joints (10.0%), and folds (27.1%)

Duration of disease

The average duration of the disease was 12.41 ± 10.10 years

Gender

Men accounted for 55.7% while women accounted for 44.3%

Age

Average age was 46.60 ± 14.77 years old with the group 30-39 accounting for the most (24.3%)

The prevalence of the MTHFR C677T genotype and its correlation with clinical and subclinical characteristics among plaque psoriasis patients

Results of DNA extraction

In our study, DNA extracted from blood samples had satisfactory purity with the average optical density ratio at wavelengths 260nm and 280nm being 1.87±0.05 and the average DNA concentration being 35.17±16.29 µg/ml

The results of real-time PCR indicated that the product waveforms exhibited distinct curves, remained unaffected by disruption, and possessed the intended color. The real-time PCR products corresponding to the MTHFR C677T gene were illustrated in Figure 1 and Figure 2

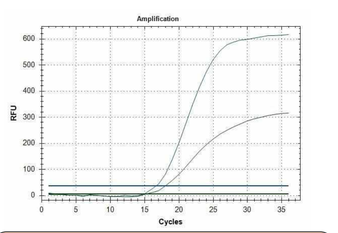

Figure 1. Realtime-PCR results of MTHFR C677T C/C gene phenotype of Patient Le Tin H. (green indicates C allele)

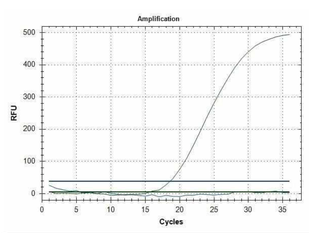

Figure 2. Realtime-PCR results of MTHFR C677T C/T gene phenotype of patient Thi S. (blue color indicates T allele)

Table 3. Genotype distribution and allele frequency of MTHFR C677T gene on the research object

Results	n (%)			p
	CC	CT	TT	
Genotype	26 (52.0)	24 (48.0)	0 (0)	0.039
Allele	C		T	
	76 (76.0)		24 (24.0)	

Table 3 indicates genotype distribution and allele frequency of MTHFR C677T gene on the research object. 48% of the patients with plaque psoriasis had the MTHFR C677T C/T phenotype and there were no cases with the T/T phenotype. The frequency of the T allele in patients with plaque psoriasis was 24.0%.

Relationship of MTHFR C677T gene phenotype with clinical and subclinical characteristics of plaque psoriasis patients

Table 4 shows MTHFR C677T gene polymorphism and family history of psoriasis in patients with plaque psoriasis. People carrying the MTHFR C677T C/T gene phenotype had a higher family history of plaque psoriasis (53.8% versus 45.9%). The difference was not statistically significant (p>0.05).

Data from comparison of MTHFR C677T gene polymorphism with clinical characteristics of plaque psoriasis patients were in table 4. Patients with plaque psoriasis with the MTHFR C677T C/T phenotype had a longer disease duration than the group with the MTHFR C677T C/C phenotype (13.83±10.45 versus 8.27±5.71 years). The difference was statistically significant (p=0.022).

Regarding comparison of MTHFR C677T gene polymorphism with clinical symptoms of plaque psoriasis patients, we found no significant difference in the frequency of clinical symptoms of the disease between the group carrying the T allele and not carrying the T allele (p>0.05). However, people carrying the T allele had more fold lesions (37.5% compared to 11.5%) and had statistical significance (p<0.05).

Table 4. Relationship of MTHFR C677T gene phenotype with clinical characteristics of plaque psoriasis patients

Factors	CC n (%)	CT n (%)	p
Family history of psoriasis			
No	20 (54.1)	17 (45.9)	0.624
Yes	6 (46.2)	7 (53.8)	
Clinical characteristics			
Average age (years)	44.54±15.81	46.13±12.39	0.694
Age of onset (years)	34.81±15.01	32.38±13.20	0.545
Duration of illness (years)	8.27±5.71	13.83±10.45	0.022
BMI (Kg/m²)	22.60±3.18	22.78±3.40	0.848
PASI	12.32±6.01	12.73±6.63	0.819
Clinical symptoms			
Itchy	20 (76.9)	22 (91.7)	0.162*
Dry skin	8 (30.8)	10 (41.7)	0.434*
Burning pain	2 (7.7)	5 (20.8)	0.188*
No symptoms	5 (19.2)	2 (8.3)	0.277*
Joint damage	1 (3.8)	2 (8.3)	0.521*
Nail damage	12 (46.2)	17 (70.8)	0.077
Scalp damage	8 (30.8)	6 (25.0)	0.650
Face damage	6 (23.1)	9 (37.5)	0.266
Trunk damage	16 (61.5)	20 (83.3)	0.086
Damage to limbs	18 (69.2)	16 (66.7)	0.864
Folds damage	3 (11.5)	9 (37.5)	0.032

Table 5. Relationship of MTHFR C677T gene phenotype with subclinical characteristics of plaque psoriasis patients

Factors	CC n (%)	CT n (%)	P
Waist circumference (cm)	88.88±16.08	88.29±14.05	0.890
Fasting glucose (mmol/L)	5.92±1.16	8.15±4.13	0.011
Triglyceride (mmol/L)	2.42±1.38	2.97±2.69	0.361
HDL-c (mmol/L)	1.43±0.29	1.41±0.35	0.810
Systolic blood pressure (mmHg)	126.54±18.54	132.92±22.55	0.283
Diastolic blood pressure (mmHg)	73.08±9.70	72.92±11.97	0.959

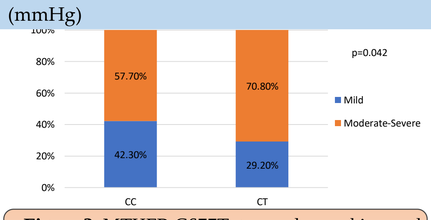

Figure 3. MTHFR C677T gene polymorphism and severity of plaque psoriasis

Figure 3 indicates relationship between MTHFR C677T gene polymorphism and severity of plaque psoriasis. Patients carrying the T allele had moderate-severe plaque psoriasis more than the group of patients not carrying the T allele (70.8% compared to 57.7%) and had statistical significance (p= 0.042).

Table 5 demonstrates relationship between MTHFR C677T gene polymorphism with some subclinical tests of plaque psoriasis patients. There was a difference in fasting glucose concentration between people carrying the T allele and not carrying the T allele (p<0.05).

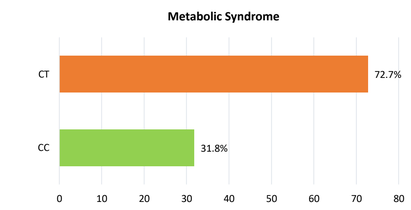

Figure 4. MTHFR C677T gene polymorphism and metabolic syndrome in patients with plaque psoriasis (p=0.01)

Figure 4 demonstrates relationship between MTHFR C677T gene polymorphism and metabolic syndrome in patients with plaque psoriasis (p=0.01). MTHFR C677T C/T phenotype was more common than MTHFR C677T C/C phenotype in plaque psoriasis patients with metabolic syndrome (72.7% versus 31.8%). There was a difference in metabolic syndrome between T allele carriers and non-T allele carriers (p=0.016)

CONCLUSION

The proportions of men and women were 55.7% and 44.3% respectively.

Patients diagnosed with plaque psoriasis had an average age of 46.60±14.77 years. 85.7% of psoriasis patients experienced pruritus. The mean duration of the disease was 12.96 years. The incidence of moderate plaque psoriasis was the highest at 41.4%, followed by mild at 34.3% and severe at 24.3%. Metabolic syndrome comprised 47.1% of the total. The mean age of onset for the preponderance of plaque psoriasis patients with MS was 40.23 years, whereas the age of onset for the group without metabolic syndrome was 23.42 years. Plaque psoriasis patients with the MTHFR C677T C/T genotype (48%) and the T allele frequency was higher than the control group and there were no cases carrying the MTHFR C677T T/T. The difference in prevalence of moderate-to-severe plaque psoriasis between patients carrying the T allele (70.8% vs. 57.7%) and those without the T allele was statistically significant. Compared to MTHFR C677T C/C genotype carriers, MTHFR C677T C/T genotype carriers had a prolonged disease duration, fold lesions more frequently, elevated fasting blood sugar levels, and a greater risk of metabolic syndrome.

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***Main author's contact details:**
Full name: ***Ha Thi Thao Mai***
Workplace: Can Tho University of Medicine and Pharmacy – Can Tho Hospital of Dermato - Venereology
Address: 79, Nguyen Van Cu Street, An Khanh Ward, Ninh Kieu District, Can Tho City
Email: httmai@ctump.edu.vn
Mobile: 0939.543.868