ORIGINAL ARTICLE

Association of Human Leukocyte Antigens (HLA) with Keloids and Hypertrophic Scar in Thais

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Background: Keloids and hypertrophic scars are abnormal fibro-proliferative lesions. Associations between genes, the human leukocyte antigen (HLA) system in particular, and keloids have been studied in various ethnic groups but not in Thais.

Objective: To investigate the association of HLA alleles with keloids and hypertrophic scars in Thais.

Materials and Methods: The present study employed a retrospective case-control design. Scar assessment was performed on 139 kidney donors who underwent nephrectomy at Ramathibodi Hospital between January 2008 and December 2015. The wound scars after nephrectomy were evaluated and graded by a plastic surgeon using the modified Vancouver Scar Scale. Kidney donors who were unable to communicate well or who had autoimmune diseases or complications from surgery were excluded from the study. The diagnosis of a keloid scar, hypertrophic scar, and flat scar was made by clinical criteria. The donors were categorized into groups with three scar types, flat as the control group, hypertrophic, and keloid. The associations between the frequencies of HLA antigen with hypertrophic scar and keloids were measured with an odds ratio using logistic regression analysis.

Results: Of the 139 living kidney donors, 15 (10.8%) had keloids, 46 (33.1%) had hypertrophic scars, and 78 (56.1%) had flat scars. Sixty-one HLA-A, -B, -DRB1, and -DQB1 alleles were evaluated in the present study. Compared with controls, the allele frequency of HLA-DRB1*15 was significantly higher in the keloid group at 43.33% versus 24.36% (odds ratio 2.37, 95% confidence interval 1.06 to 5.33, p=0.036). No significant association between HLA alleles and hypertrophic scars was found.

Conclusion: The present study demonstrated the positive association of HLA-DRB1*15 with keloids in Thai individuals. The HLA-DRB1*15 could be a susceptibility factor for the development of keloids.

Keywords: Human leukocyte antigen; Keloids; Thais, HLA-DRB1; Positive association

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Keloid scar and hypertrophic scar are two forms of excessive dermal fibrosis and cutaneous scarring that can occur following cutaneous injury. Hypertrophic scars do not extend beyond the initial site of injury and, after quick growth, can gradually regress over a period of a few years, eventually leading to flat scars with no further symptoms. Keloid scar, in contrast, typically project beyond the original wound margin with no regression. Keloid disease is known to be a familial condition, occurring more commonly in particular ethnic groups[1,2]. Incidence rates of keloids in African Americans and Asian women after caesarean section have been reported to be significantly higher than those in Caucasian women at 7.1% versus 0.5% [odds ratio (OR) 16.5, p=0.007] and 5.2% versus 0.5% (OR 11.9, p=0.02), respectively[1]. The high incidence rates in ethnicities with darker skin pigmentation underscore a strong genetic predisposition to keloids. The mechanisms behind keloid scar formation are still unclear. Nevertheless, genetics, environmental factors, topography or particular skin sites, and abnormal cellular responses have been found to contribute to keloid scar development[3].

Major histocompatibility complex (MHC), also known as the human leukocyte antigen (HLA) system, is the most polymorphic system in the

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human genome. It is, therefore, a potential target for identifying genetic markers of the disease. Indeed, associations between specific HLA alleles and keloid disease have been reported. Brown et al. investigated the HLA association with keloid disease in Caucasian patients and found that HLA-DRB1*15 increased susceptibility to the disease[4]. Studies performed in Han Chinese subjects showed that certain HLAs and haplotypes, such as HLA-A*03, A*25, B*07, DRB1*15, B*07-DQB1*05:01, B*07-DRB1*15, and DQB1*05:03-DRB1*15, were associated with keloids[5-7]. However, the relationship between HLA and keloids among other Asian populations is unclear. To date, there are no reports on any relationship between HLA and keloids in Thai individuals. Therefore, the aim of the present study was to investigate the potential association of HLA with keloid and hypertrophic scars in Thais.

Materials and Methods

Study population

The present study was a retrospective case-control study. The study population included 139 living kidney donors who had undergone open or laparoscopic nephrectomy between January 2008 and December 2015 at Ramathibodi Hospital, Mahidol University, Bangkok, Thailand. All donors were of Thai ethnicity, had normal kidney function, and had no complications for at least a year following surgery. Kidney donors who were unable to communicate well or who had complications from surgery such as wound infection or dehiscence, were excluded from the study. Since associations of HLA with various autoimmune diseases have been established[8-10], kidney donors who had autoimmune diseases were excluded from the study to control the bias.

Data collection

Data on baseline characteristics were collected from medical records and face-to-face interviews using structured questionnaires. Baseline characteristics included gender, age, underlying diseases, family history of keloids, and surgical technique. Scar evaluation was performed by a plastic surgeon. The modified Vancouver Scar Scale (mVSS) was used for scar assessment[11]. Scar parameters included pigmentation, pliability, height, and vascularity. The diagnosis of a keloid scar, hypertrophic scar, and flat scar was made by clinical criteria. Keloid scar was defined as a dermal tumor that spread beyond the margin of the wound, continued to grow over time, did not regress spontaneously, and commonly recurred. A hypertrophic scar was defined as a raised scar that remained within the boundaries of the original lesion, often regressed spontaneously within months, and rarely recurred. A flat scar was a normal healing scar defined by fading of redness and softening of the scar, a thin and pale line, and a non-itchy mature scar. Donors with flat scars in the present study were identified as the control group. All donors were followed up for at least a year. The present study was approved by the Institutional Review Board of the Faculty of Medicine Ramathibodi Hospital, Mahidol University (approval number 2018/916), and written consent was obtained from all individuals included in the present study.

HLA typing

HLA-A, -B, -DRB1, and -DQB1 typing of the donors were performed by molecular techniques at the Histocompatibility and Immunogenetics Laboratory, Department of Pathology, Faculty of Medicine Ramathibodi Hospital, Bangkok, Thailand. HLA-A and -B typing at low/intermediate resolution was performed by molecular typing using sequence-specific oligonucleotide probes with INNO-LiPA HLA class I kits (Innogenetics, Gent, Belgium). HLA-DRB1 and -DQB1 typing at low resolution and HLA-DRB1*15 high resolution were performed by polymerase chain reaction-sequence specific primer (PCR-SSP) with MicroSSP class II kits (One Lambda Inc., A Thermo Fisher Scientific Brand, Canoga Park, CA). The HLA-B*15 and HLA-B*40 alleles having the same serologically defined split antigens were classified together. The assignment of split antigens was performed based on the IMGT/HLA database (http://ebi.ac.uk/imgt/hla).

Statistical analysis

The donors were categorized into three groups based on their scar features as keloid scar, hypertrophic scar, and flat scar as the control group. Baseline characteristics were compared among groups using a chi-squared test for categorical variables and a one-way analysis of variance for parametric continuous variables. Allele frequencies (AF) were calculated by using the following formula: allele frequency (%) = $(n/2N) \times 100$ when n=sum of a particular allele and N=the total number of individuals. The relationships between the frequencies of HLA antigen with hypertrophic scar and keloids were measured with OR using logistic regression analysis. A p-value less than 0.05 was considered statistically significant, and ORs with 95% confidence intervals (CIs) were

Table 1. Demographic and clinical characteristics of the study population

Characteristics	Keloids (n=15)	Hypertrophic scar (n=46)	Control (n=78)	p-value
Sex; n (%)				0.370
Female	10 (66.7)	36 (78.3)	52 (66.7)	
Male	5 (33.3)	10 (21.7)	26 (33.3)	0.506
Age (years); mean±SD	33.73±8.77	36.13±9.78	36.77±8.98	
Side of nephrectomy; n (%)				0.797
Left	11 (73.3)	36 (78.3)	63 (80.8)	
Right	4 (26.7)	10 (21.7)	15 (19.2)	
Technique of nephrectomy; n (%)				0.022
Open	7 (46.7)	27 (58.7)	26 (33.3)	
Laparoscopic	8 (53.3)	19 (41.3)	52 (66.7)	
Family history of keloid; n (%)				<0.001
Yes	11 (73.3)	8 (17.4)	12 (15.4)	
No	4 (26.7)	38 (82.6)	66 (84.6)	
mVSS (total score); n (%)				<0.001
<6	1 (6.7)	31 (67.4)	78 (100)	
6 to 10	12 (80.0)	15 (32.6)	0 (0.0)	
>10	2 (13.3)	0 (0.0)	0 (0.0)	

SD=standard deviation; mVSS=modified Vancouver Scar Scale

used to evaluate the strength of the associations. All analyses were carried out using the Stata Statistical Software, version 16.1 (StataCorp LLC, College Station, TX, USA).

Results

Of the 139 living kidney donors, 15 (10.8%) had keloids, 46 (33.1%) had hypertrophic scars, and 78 (56.1%) had flat scars. The demographic and clinical characteristics of the study population are presented in Table 1. There was no difference in age, gender, and side of nephrectomy among the keloid, hypertrophic scar, and control groups. Unsurprisingly, the frequencies of kidney donors with mVSS greater than 10 and with mVSS 6 to 10 were higher in the keloid group than that in the control and hypertrophic scar groups. The frequency of kidney donors with a family history of keloid was also higher in the keloid group than that in the control and the hypertrophic scar groups.

Association between HLA alleles and keloid and hypertrophic scar

The frequencies of HLA-A and -B alleles in the three groups are shown in Table 2. The alleles that are not present in the keloid group are not shown. AF in the keloid and hypertrophic scar groups were compared to those in the control group to identify susceptibility alleles that confer a risk for keloid and hypertrophic scar. No association between HLA-A and -B alleles with keloids and the hypertrophic scar was found.

The frequencies of HLA-DRB1 and -DQB1 alleles in the three groups are shown in Table 3. The frequency of HLA-DRB1*15 was significantly higher in the keloid group than in the control group at 43.33% versus 24.36% (OR 2.37, 95% CI 1.06 to 5.33, p=0.036). No difference was found between the frequencies of HLA-DRB1 alleles in the hypertrophic scar group and the control group. HLA-DQB1 alleles did not show any associations with keloids and hypertrophic scar.

To explore which HLA-DRB1*15 subtypes were associated with keloids, high-resolution (four-digit) typing of DRB1*15 positive kidney donors was performed. The frequencies of DRB1*15:01 and *15:02 alleles of DRB1*15 individuals between the keloid group and controls were not different at DRB1*15:01 for 53.8% versus 54.1% and DRB1*15:02 for 46.2% versus 45.9%, respectively.

Discussion

The present study investigated the potential association between HLA and keloids in Thai individuals. The authors evaluated the scars after nephrectomy in living kidney donors and classified the study population into keloid and hypertrophic scar groups, individuals with flat scars as a control group. The main finding was a strong association between HLA-DRB1*15 and keloids in Thai individuals.

Table 2. The frequencies and odds ratio of HLA-A and -B alleles in patients with keloids, hypertrophic scar, and controls

HLA	Keloids (2n=30)		Hypertrophic scar (2n=92)		Control (2n=156)		Keloid vs. Hypertrophic scar	Keloid vs. Control			Hypertrophic scar vs. Control		
	n	%	n	%	n	%	p-value	OR	95% CI	p-value	OR	95% CI	p-value
A*01	0	0.00	1	1.09	3	1.92	1.000	NA	NA	NA	0.56	0.06 to 5.47	0.62
A*02	3	10.00	24	26.09	31	19.87	0.065	0.45	0.13 to 1.57	0.210	1.42	0.77 to 2.62	0.26
A*11	15	50.00	31	33.70	52	33.33	0.110	2.00	0.91 to 4.40	0.085	1.02	0.59 to 1.75	0.95
A*24	9	30.00	20	21.74	33	21.15	0.356	1.60	0.67 to 3.81	0.292	1.03	0.55 to 1.94	0.91
A*30	1	3.33	0	0.00	3	1.92	0.246	1.76	0.18 to 17.50	0.630	NA	NA	NA
A*31	1	3.33	0	0.00	0	0.00	0.246	NA	NA	NA	NA	NA	NA
A*33	1	3.33	8	8.70	22	14.1	0.450	0.21	0.03 to 1.62	0.135	0.58	0.25 to 1.36	0.21
B*07	1	3.33	1	1.09	6	3.85	0.433	0.86	0.10 to 7.43	0.893	0.27	0.03 to 2.32	0.23
B*13	3	10.00	4	4.35	11	7.05	0.361	1.46	0.38 to 5.60	0.577	0.59	0.18 to 1.94	0.39
B*18	2	6.67	5	5.43	12	7.69	1.000	0.86	0.18 to 4.04	0.846	0.67	0.23 to 2.02	0.50
B*35	2	6.67	6	6.52	10	6.41	1.000	1.04	0.22 to 5.02	0.958	1.02	0.36 to 2.90	0.97
B*38	4	13.33	4	4.35	7	4.49	0.101	3.27	0.89 to 11.98	0.073	0.97	0.27 to 3.40	0.95
B*39	1	3.33	1	1.09	2	1.28	0.433	2.65	0.23 to 30.25	0.431	0.85	0.07 to 9.46	0.89
B*46	1	3.33	13	14.13	18	11.54	0.184	0.26	0.03 to 2.05	0.204	1.26	0.59 to 2.71	0.55
B*48	2	6.67	0	0.00	0	0.00	0.059	NA	NA	NA	NA	NA	NA
B*51	3	10.00	5	5.43	7	4.49	0.405	2.36	0.57 to 9.72	0.233	1.22	0.38 to 3.97	0.74
B*58	1	3.33	6	6.52	9	5.77	1.000	0.56	0.07 to 4.62	0.593	1.14	0.39 to 3.31	0.81
B*40 (60)[a]	3	10.00	7	7.61	15	9.62	0.706	1.04	0.28 to 3.86	0.948	0.77	0.30 to 1.97	0.59
B*40 (61)[a]	1	3.33	1	1.09	3	1.92	0.433	1.76	0.18 to 17.50	0.630	0.56	0.06 to 5.47	0.62
B*15 (62)[a]	3	10.00	0	0.00	6	3.85	0.014	2.78	0.65 to 11.78	0.166	NA	NA	NA
B*15 (75)[a]	3	10.00	14	15.22	23	14.74	0.560	0.64	0.18 to 2.29	0.496	1.04	0.50 to 2.13	0.92

CI=confidence interval; HLA=human leukocyte antigen; NA=not available; OR=odds ratio

[a] HLA alleles in the same serologically defined split antigens were grouped together. The defined split antigens were indicated in parentheses.

Table 3. The frequencies and odds ratio of HLA-DRB1 and -DQB1 alleles in patients with keloids, hypertrophic scar, and controls

HLA	Keloids (2n=30)		Hypertrophic scar (2n=92)		Control (2n=156)		Keloid vs. Hypertrophic scar	Keloid vs. Control			Hypertrophic scar vs. Control		
	n	%	n	%	n	%	p-value	OR	95% CI	p-value	OR	95% CI	p-value
DRB1*03	1	3.33	7	7.61	8	5.13	0.678	0.64	0.77 to 5.30	0.677	1.52	0.53 to 4.35	0.431
DRB1*04	1	3.33	13	14.13	18	11.54	0.184	0.26	0.03 to 2.06	0.204	1.26	0.59 to 2.71	0.552
DRB1*07	1	3.33	5	5.43	7	4.49	1.000	0.73	0.09 to 6.19	0.776	1.22	0.38 to 3.97	0.737
DRB1*08	1	3.33	2	2.17	4	2.56	1.000	1.31	0.14 to 12.15	0.812	0.84	0.15 to 4.70	0.847
DRB1*09	1	3.33	9	9.78	19	12.18	0.448	0.25	0.03 to 1.93	0.183	0.78	0.34 to 1.81	0.565
DRB1*10	0	0.00	5	5.43	3	1.92	0.332	NA	NA	NA	2.93	0.68 to 12.56	0.148
DRB1*11	4	13.33	5	5.43	11	7.05	0.221	2.03	0.60 to 6.85	0.255	0.76	0.25 to 2.25	0.618
DRB1*12	4	13.33	15	16.30	29	18.59	1.000	0.67	0.22 to 2.08	0.492	0.85	0.43 to 1.69	0.649
DRB1*13	1	3.33	4	4.35	3	1.92	1.000	1.76	0.18 to 17.50	0.630	2.32	0.51 to 10.59	0.278
DRB1*14	2	6.67	6	6.52	11	7.05	1.000	0.94	0.20 to 4.48	0.940	0.92	0.33 to 2.57	0.873
DRB1*15	13	43.33	15	16.30	38	24.36	0.002	2.37	1.06 to 5.33	0.036	0.60	0.31 to 1.17	0.137
DRB1*16	1	3.33	6	6.52	5	3.21	1.000	1.04	0.12 to 9.24	0.971	2.11	0.62 to 7.11	0.230
DQB1*02	2	6.67	11	11.96	14	8.97	0.517	0.72	0.15 to 3.37	0.681	1.38	0.60 to 3.18	0.453
DQB1*04	1	3.33	3	3.26	11	7.05	1.000	0.45	0.06 to 3.66	0.459	0.44	0.12 to 1.64	0.223
DQB1*05	10	33.33	29	31.52	47	30.13	1.000	1.16	0.50 to 2.67	0.727	1.07	0.61 to 1.86	0.818
DQB1*06	6	20.00	10	10.87	17	10.90	0.219	2.04	0.73 to 5.71	0.172	0.99	0.43 to 2.28	0.995
DQB1*03:01	10	33.33	21	22.83	38	24.36	0.251	1.55	0.67 to 3.60	0.306	0.92	0.50 to 1.67	0.784
DQB1*03:02	0	0.00	8	8.70	8	5.13	0.198	NA	NA	NA	1.76	0.64 to 4.87	0.275
DQB1*03:03	1	3.33	10	10.87	21	13.46	0.290	0.22	0.03 to 1.71	0.149	0.78	0.35 to 1.15	0.552

CI=confidence interval; HLA=human leukocyte antigen; NA=not available; OR=odds ratio

Notably, the finding of the involvement of HLA-DRB1*15 in keloids in the present study is consistent with the results of two previous studies[4,6]. In a study by Brown et al., performed in a cohort of Caucasians of Northern European origin, the HLA-DRB1*15 allele was more frequent in keloid patients than in the control group at (38.8% versus 20.9% (p=0.017)[4]. Further evidence of the association between HLA-DRB1*15 and keloids was demonstrated by Lu et al. in a Han Chinese cohort[6]. In their study, the frequency of HLA-DRB1*15 was significantly higher in keloid patients compared with controls at 19.01% versus 12.09% (OR 2.10, 95% CI 1.38 to 3.20, corrected p=0.024). In contrast, a study in African Caribbean patients of Jamaican origin found no associations between any specific HLA-DRB1 alleles and keloids[12]. Taken together, the present study and the previous studies in Caucasians and Han Chinese individuals strongly suggest that HLA-DRB1*15 confers an increased risk for keloid scar. The conflicting results observed in the African-Caribbean cohort may be explained by the difference in high-resolution HLA-DRB1*15 alleles in the studied subjects. Since low-resolution typing was performed in these studies, the data of high-resolution HLA alleles were inferred from the studies of healthy populations. Of HLA-DRB1*15 alleles, HLA-DRB1*15:03 was the predominant allele in African and African-Caribbean populations[13,14]. A study in unrelated healthy African Caribbeans showed that the frequencies of HLA-DRB1*15:01, *15:02, and *15:03 were 1.47%, 0.05%, and 14.7%, respectively[13]. Conversely, HLA-DRB1*15:01 was the predominant allele in Caucasians and Han Chinese. In healthy Han Chinese, HLA-DRB1*15:01, *15:02, and *15:04 frequencies were 10.6%, 1.9%, and 0.09%, respectively, and HLA-DRB1*15:03 was not detected[15]. In Caucasians with European ancestry, HLA-DRB1*15:01, *15:02, and *15:03 frequencies were 12.8%, 1.1%, and 0.02%, respectively[16]. In the present study, the high-resolution typing of DRB1*15 positive kidney donors showed that the most common allele was HLA-DRB1*15:01, and no DRB1*15:03 were observed. Nevertheless, no positive associations were established between the high-resolution HLA-DRB1*15 allele and keloids.

In addition to the DRB1*15 association, specific HLA alleles in other loci have been reported to be associated with keloids. Lu et al. identified that HLA-A*03, A*25, B*07, and C*08:02 frequencies were significantly higher in keloid patients than in healthy controls[5]. Furthermore, HLA-DQA1*04:01, DQB1*05:01, and DQB1*05:03 have been shown to be significantly more frequent in keloid patients compared with those in controls[17]. In the present study, no significant associations between HLA class I and DQB1 alleles with keloids were observed. It should be noted that DRB1*15:02 is in linkage disequilibrium with DQB1*05:01 in the Han Chinese population[18]. It is possible that this linkage disequilibrium contributes to the positive association between DQB1*05:01 and keloids in Han Chinese. Indeed, the C*08:02-DQB1*05:01-DRB1*15 haplotype was found to be associated with keloids (p=0.0121)[7].

HLA-DRB1*15 has been shown to confer an increased risk for another fibrotic disease, such as systemic sclerosis, an immune-mediated disease characterized by skin fibrosis and internal organs. The pathophysiology of systemic sclerosis first includes microvascular/endothelial damage, followed by inflammation and abnormal immune response, and finally, diffuse fibrosis. This progression is comparable to the pathogenesis of keloid scarring. The DRB1*15 allele has been shown to be strongly associated with systemic sclerosis in a South African population[10]. Moreover, the significant association between the HLA-DRB1*15:02 allele and systemic sclerosis patients with anti-topoisomerase I antibody (ATA) has been consistently observed in Japanese, Korean, and Thai populations[8,9,19]. The mechanisms by which HLA-DR alleles contribute to the pathogenesis of these autoimmune diseases are still unclear. One of the mechanisms underlying the relationship between HLA-DR and systemic sclerosis is that the binding of a self-peptide, topoisomerase I (top I) peptide with the systemic sclerosis-associated HLA-DR alleles is stronger than the binding with the non-associated HLA-DR allele[20]. The strong binding of the HLA-self peptide complex leads to an immune response against antigens. An in vitro study showed that the immune complex of ATA-top I induced proinflammatory and profibrotic effects on skin fibroblasts[21]. The hypothesis that keloids possess characteristics of autoimmune diseases has been investigated by Jiao et al[22]. They found that the level of autoantibody to RNA-associated protein, hnRNPA2B1, was elevated in sera from keloid patients compared with sera from healthy controls. In addition, depositions of immunoglobulin and complements such as IgA, IgM, C3, and C1q were identified in keloid tissues but not in normal skin. These results support the notion that keloid is a fibrotic skin disease that might be mediated by

autoimmune responses.

No positive associations were observed between any specific HLA alleles and hypertrophic scar in the present study. Given that hypertrophic and keloid scars show distinct clinical behavior and histopathological parameters, the risk factors associated with hypertrophic and keloid scars also appear to be different. Keloid incidence is associated with increased racially determined skin pigmentation, whereas hypertrophic scar formation is not associated with skin color or familial predisposition[3]. Lines of evidence suggest that hypertrophic and keloid scars are distinct entities. Studies comparing hypertrophic and keloid scars showed differences in the expression of proteins involving the fibrotic process[23,24], differences in extracellular matrix structure[25], and distinct ultrastructural patterns of collagen deposition[26]. Moreover, higher levels of immune cell infiltrating comprising CD3+, CD45RO+, and CD4+ T lymphocytes[24] have been demonstrated in keloid lesions compared with those seen in hypertrophic scars and normal tissue. The fact that keloid and hypertrophic scars are separate entities could explain why the results of the HLA association between keloids and hypertrophic scars were different.

The present study should be interpreted within the context of its limitations. First, the number of cases in this study was small, which may not provide sufficient statistical power to detect significant associations. In addition, the limited sample size may be too small to represent the Thai population accurately. Second, the present study investigated scars only in living kidney donors. Collecting data for keloid, hypertrophic scar, and control groups from living kidney donors would ensure that the scars originate from similar surgical incisions. These living donors, however, had undergone nephrectomy at a single center, which may result in selective bias and not be representative of the general population. Further studies with larger sample sizes and in broader types of patients are required to confirm the association. Third, the present study was conducted only in Thais. Therefore, the findings may not apply to other ethnic groups. More research is needed to determine if the associations observed in the present study could be replicated in other populations. Fourth, the present study investigated only the association between HLA-A, -B, -DRB1, and -DQB1 alleles with keloids and hypertrophic scars. Other genes within the MHC might be involved in keloid susceptibility. Future investigation of an association of other genes or HLA haplotypes with keloids might bring a better understanding of the involvement of HLA in keloid development. Fifth, the present study did not explore other factors associated with keloids, including hypertension and vitamin D deficiency[27,28]. The lack of information on other keloid factors may have caused a confounding bias.

In conclusion, the present study demonstrated that the HLA-DRB1*15 allele is significantly associated with keloids in Thai individuals. The results of the present study support the previous reports' findings in Caucasian and Han Chinese cohorts. HLA-DRB1*15 might be identified as a potential genetic marker for keloid disease and warrants further investigation in larger cohorts.

What is already known on this topic?

Studies have previously shown positive associations between HLA and a predisposition to keloids in different ethnic backgrounds. HLA-DRB1*15 is consistently associated with the risk of developing keloids in Caucasian and Han Chinese cohorts. No report has been published on HLA association with keloids in Thais.

What does this study add?

In the Thai cohort, the frequency of HLA-DRB1*15 was significantly higher in the keloid group than in the control group at 43.33% versus 24.36% (OR 2.37, 95% CI 1.06 to 5.33, p=0.036). The present study demonstrated a strong association between HLA-DRB1*15 and the risk of developing keloids in Thai individuals.

Conflicts of interest

The authors declare no conflict of interest.

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