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Research article

Clinical characteristics and associations with atherosclerosis among adult patients with psoriasis vulgaris: A multi-centered study in Vietnam

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ABSTRACT

This study measured clinical characteristics and factors associated with Psoriasis Area and Severity Index (PASI) scores among adult patients with psoriasis vulgaris and associations between psoriasis vulgaris characteristics and atherosclerosis in Vietnamese hospitals. A cross-sectional study was conducted at a hospital in Hanoi, Vietnam. A total of 210 patients with psoriasis vulgaris were recruited. Clinical characteristics and PASI score were measured. Atherosclerosis was assessed. Multivariate regression models were used. Results showed that the mean PASI score was 9.6 (SD=6.1). The majority of patients (52.9%) had atherosclerosis. The carotid, lower, and upper limbs atherosclerosis rates were 48.8%, 24.4%, and 17.7%, respectively. Duration of disease (Coef.=0.07; 95%CI=0.01-0.12), plaque type (Coef.=2.38; 95%CI=0.71-4.04), elevated triglyceride (Coef.=1.07; 95%CI=0.04-2.11) and LDL-C (Coef.=1.14; 95%CI=0.09-2.18) were positively correlated with PASI score. Similarly, itching (Coef.=2.78, 95%CI=1.34-4.23); pain (Coef.=4.03; 95%CI=2.48-5.58), skinredness (Coef.=2.33, 95%CI=0.75-3.91) were positively related to PASI score. Patients with higher disease duration (OR=1.06, 95%CI=1.02-1.10) were more likely to have atherosclerosis. Suffering elevated triglyceride (OR=2.36, 95%CI=1.27-4.37), combined injury in joints (OR=2.17, 95%CI=1.05-4.47), and having plaque psoriasis (OR=4.38, 95%CI=1.48-12.99) were positively associated with the likelihood of having atherosclerosis. To conclude, the study provided a clinical characterisation of psoriasis vulgaris in Vietnamese patients. The study findings indicated that factors such as duration and type of psoriasis, elevated triglyceride, and combined joint injury were associated with atherosclerosis.

Keywords: Clinical characteristic, Psoriasis, PASI, Determinant, Severity, Atherosclerosis.

INTRODUCTION

Psoriasis is a systemic inflammatory disease affecting over 125 million individuals globally [1]. The prevalence of psoriasis in adults exhibited variation, ranging from 0.14% in East Asia to 1.99%in Australasia [2]. A considerable proportion of individuals who have psoriasis, amounting to approximately 30%, have been found to manifest various comorbidities of clinical significance, encompassing conditions such as arthritis, cardiovascular disease, inflammatory bowel disease, chronic kidney disease, malignant tumours, infection, mental disorders, and metabolic syndrome [2,3]. Individuals with psoriasis experience not only physical skin damage but also frequently encounter physical and psychological comorbidities as a result of compromised skin integrity, low self-esteem, feelings of embarrassment, anxiety, and depression. These factors contribute to these patients' diminished quality of life [4,5].

Although there has been significant progress, there are still unresolved issues about understanding the pathogenesis of psoriasis [6]. However, it is widely acknowledged in the academic community that psoriasis results from a complex interplay between genetic factors, environmental influences, and the immune system [6].

In recent decades, there has been a consistent improvement in the effectiveness of treatments for psoriasis [7]. Systemic agents, such as biological agents designed to target inflammatory cytokines, have been identified as highly efficacious treatment modalities. The enhanced effectiveness of biological agents has resulted in the implementation of more rigorous clinical outcome measures for trials. Several trials have included clinical endpoints such as the attainment of a body surface area (BSA) ≤ 1% and a 90% or 100% reduction in Psoriasis Area and Severity Index (PASI) [8,9]. The current gold standard for evaluating the severity of psoriasis is the PASI, which integrates the evaluation of lesion severity and affected area extent into a singular index score [10]. The PASI score presented a significant determinant in the decision to commence biological therapy [11].

Psoriasis presents with both cutaneous lesions and an increased susceptibility to cardiovascular diseases (CVD). Emerging evidence suggests a potential association between psoriasis and an increased risk of cardiovascular diseases in affected individuals. The conditions above encompass elevated blood pressure, type 2 diabetes mellitus, obesity, and heightened serum cholesterol levels [12]. Within a decade of being diagnosed, patients face a notable 6.2% risk of experiencing an adverse cardiovascular event. This observation is evident in high-grade psoriasis compared to the non-at-risk population. Psoriasis is correlated with a heightened likelihood of CVD in 25% of individuals, independent of factors such as hyperlipidemia, smoking, and obesity [13].There is a heightened susceptibility to atherosclerotic CVD in individuals with psoriasis, potentially attributable to elevated systemic inflammation. It has been hypothesised that the early onset of atherosclerosis in individuals with psoriasis may contribute to the high risk of CVD. Furthermore, studies have reported compromised vascular endothelial function in patients with psoriasis [14].

Along with understanding the factors associated with PASI scores for creating effective treatment plans for patients with psoriasis, there is a continuing need for new biomarkers to assess the risk of atherosclerosis in psoriasis to prevent the onset of CVD. This study aims to measure clinical characteristics and factors associated with PASI scores among adult patients with psoriasis and associations between psoriasis characteristics and atherosclerosis in Vietnamese hospitals.

MATERIALS AND METHODS

Study design

A cross-sectional descriptive study was conducted at the National Dermatology Hospital and Friendship Hospital in Hanoi, Vietnam, from 5/4/2023 to 31/12/2023. All patients diagnosed with psoriasis vulgaris (classified as the standard type) were referred to two selected hospitals for examination and treatment as part of the study. The selection criteria include: 1) Being at least 18 years of age; 2) Having a confirmed diagnosis of psoriasis vulgaris; 3) Completing all clinical and paraclinical diagnoses; 4) not receiving statin treatment; and 5) Agreeing to participate in the study. The convenient sampling method was applied, and 210 patients who met the selection criteria participated in the study. The study protocol received approval from the Institutional Review Board of Hanoi Medical University (Code:859/GCN-HDDDNCYSH-DHYHN). All patients were asked to give their written informed consent.

Data collection method

The data regarding the diagnosis of psoriasis vulgaris in the study participants was obtained from their respective medical records. The data was gathered by utilising a sample of medical records. The clinical dataset encompasses demographic details, such as age, gender, and occupation, as well as medical information, including the type and duration of the illness, family and personal medical histories, smoking habits, comorbidities, body mass index, and clinical manifestations such as itching, pain, and skin redness, along with the degree of skin redness categorised as mild, moderate, or severe. Clinical data were collected, including accompanying injuries (fingernails, toenails, joints) and current treatment therapies. The examination of cholesterol, triglycerides, LDL-C, and HDL-C was conducted.

The severity of psoriasis vulgaris is commonly assessed using the PASI score. The PASI is a composite assessment tool that considers multiple dimensions of psoriasis and evaluates its severity in distinct anatomical regions, namely the head, arms, trunk, and legs. In addition, each anatomical region undergoes evaluation for three plaque attributes, including the extent of erythema (redness), induration (thickness), and desquamation (scaling). The cumulative scores of the clinical signs within each anatomical area are aggregated and subsequently adjusted based on the proportional representation of the respective area on the body. The resulting weighted scores are then transformed into a final composite score, which has a potential range from 0 to 72. The categorisation of psoriasis severity is as follows: 1) Mild severity: PASI < 10; 2) Moderate severity: 10 ≤ PASI < 20; 3) Severe severity: PASI ≥ 20 [10].

Patients underwent an arterial duplex ultrasound on the carotid, upper and lower extremities using the Vivid E95 colour Doppler ultrasound machine to diagnose arterial atherosclerosis. The diagnostic criteria for atherosclerosis include a thickening of the intima-media layer of the arteries by at least 50% compared to the surrounding intima-media layer or a thickening of the intima-media layer by more than 1.5 mm with inward bulging towards the lumen of the artery.

Statistical analysis

Stata version 16.0 was utilised to analyse the data. Descriptive statistics were employed to calculate the mean, standard deviation, frequency, and percentage to present the central tendency, dispersion, frequency, and proportion of the data. The study used chi-square tests to assess variances in disease severity among different demographic and clinical characteristics. A multivariate linear regression model was employed to ascertain the determinants influencing the PASI score. A Multivariate Logistic Regression model was performed to measure associations between clinical characteristics of psoriasis and the occurrence of atherosclerosis. The statistical significance was evaluated using a p-value of less than 0.05.

RESULTS AND DISCUSSION

Of 210 patients, the mean PASI score was 9.6 (SD=6.1). According to the PASI score, 56.2% had mild psoriasis, 37.6% had moderate psoriasis, and 6.2% had severe psoriasis. The mean age was 43.4 years (SD=12.6). Most patients were male (67.0%) and self-employed (29.2%). Only 12.4% had family members with psoriasis, and 22.0% smoked regularly. No difference in psoriasis severity was found across demographic characteristics (p>0.05). (Table 1).

Table 1: PASI classifications according to demographic characteristics

Characteristics	PASI classification						Total		p-value
	Mild		Moderate		Severe				
	N	%	N	%	N	%	N	%	
Total	**118**	**56.2**	**79**	**37.6**	**13**	**6.2**	**210**	**100.0**	
Age group									
18-30	24	20.3	13	16.5	4	33.3	41	19.6	0.52
31-40	29	24.6	15	19.0	4	33.3	48	23.0	
41-50	22	18.6	19	24.1	2	16.7	43	20.6	
≥51	43	36.4	32	40.5	2	16.7	77	36.8	
Gender									
Female	47	39.8	19	24.1	3	25.0	69	33.0	0.06
Male	71	60.2	60	76.0	9	75.0	140	67.0	
Occupation									
Farmer	18	15.3	18	22.8	2	16.7	38	18.2	0.50
Blue-collar worker	13	11.0	14	17.7	3	25.0	30	14.4	
Office	9	7.6	5	6.3	0	0.0	14	6.7	
Self-employed	35	29.7	23	29.1	3	25.0	61	29.2	
Others	43	36.4	19	24.1	4	33.3	66	31.6	
Family's history of psoriasis									
No	107	90.7	68	86.1	8	66.7	183	87.6	0.61
Yes	11	9.3	11	13.9	4	33.3	26	12.4	
Regular smoking									
No	95	80.5	59	74.7	9	75.0	163	78.0	0.61
Yes	23	19.5	20	25.3	3	25.0	46	22.0	

Table 2 shows that the mean duration of the disease was 12.6 years (SD=8.8), and the mean BMI was 22.4 kg/m^2 (SD=3.2). 8.6% had at least one comorbidity. The majority of patients had plaque psoriasis (88.5%). The main clinical symptoms were skin redness (58.6%), itch (40.5%) and pain (15.7%). Regarding levels of skin redness, most of them had none-mild levels (50.7%), 39.2% had moderate levels, and 10.1% had severe levels. The proportion of patients having combined injury in fingernails, toenails and joints was 67.9%, 63.6% and 31.1%, respectively. The most common treatment medication was methotrexate (34.3%), topical (32.9%) and Acitretin(Fellaini) (24.3%). Regarding subclinical results, rates of elevated cholesterol, elevated triglyceride, reduced HDL-C and elevated LDL-C were 48.1%, 53.3%, 31.9% and 60.5%, respectively. Significant differences in psoriasis severity were found across the types of psoriasis, having pain symptom and skin redness symptoms, having a combined injury in fingernails and toenails, receiving topical and Acitretin (Fellaini) therapies, and having elevated triglyceride (p<0.05).

Table 3 reveals that duration of disease (Coef. =0.07; 95%CI=0.01-0.12), having plaque psoriasis (Coef. =2.38; 95%CI=0.71-4.04), having elevated triglyceride (Coef. =1.07; 95%CI=0.04-2.11) and LDL-C (Coef. =1.14; 95%CI=0.09-2.18) were positively correlated with PASI score. Similarly, having itching (Coef. =2.78, 95%CI=1.34-4.23); pain (Coef. =4.03; 95%CI=2.48-5.58), skinredness (Coef. =2.33, 95%CI=0.75-3.91) were positively related to PASI score. Regarding treatment, the PASI score was positively associated with receiving cyclosporin, UVA/UVB or methotrexate.

Table 4 shows that patients with higher disease duration (OR=1.06, 95%CI=1.02-1.10) were more likely to have atherosclerosis. Suffering elevated triglyceride (OR=2.36, 95%CI=1.27-4.37), combined injury in joints (OR=2.17, 95%CI=1.05-4.47) and having plaque psoriasis (OR=4.38, 95%CI=1.48-12.99) were positively associated with the likelihood of having atherosclerosis.

Table 2: PASI classifications according to clinical characteristics

Characteristics	PASI classification						Total		p-value
	Mild		Moderate		Severe				
	N	%	N	%	N	%	N	%	
Duration of disease									
1-5 years	38	32.2	12	15.2	3	25.0	53	25.4	0.16
6-10 years	24	20.3	25	31.7	2	16.7	51	24.4	
11-15 years	17	14.4	14	17.7	3	25.0	34	16.3	
> 15 years	39	33.1	28	35.4	4	33.3	71	34.0	
Body mass index classification									
Standard (18.5–22.9 kg/m^2)	66	55.9	43	54.4	6	46.2	114	54.3	0.88
Underweight (<18.5 kg/m^2)	8	6.8	8	10.1	1	7.7	17	8.1	
Overweight/obesity (>22.9 kg/m^2)	44	37.3	28	35.4	6	46.2	79	37.6	
Type of psoriasis vulgaris									
Guttate	22	18.6	2	2.5	0	0.0	24	11.5	<0.01
Plaque	96	81.4	77	97.5	12	100.0	185	88.5	
Comorbidity									
No	108	91.5	71	89.9	12	100.0	191	91.4	0.51
Yes	10	8.5	8	10.1	0	0.0	18	8.6	
Clinical symptoms									
None	14	11.9	0	0.0	0	0.0	14	6.7	<0.01
Itch	50	42.4	30	38.0	5	38.5	85	40.5	0.82
Pain	8	6.8	19	24.1	6	46.2	33	15.7	<0.01
Skin redness	51	43.2	63	79.8	9	69.2	123	58.6	<0.01
Skin redness									
None-Mild	100	84.8	6	7.6	0	0.0	106	50.7	<0.01
Moderate	18	15.3	59	74.7	5	41.7	82	39.2	
Severe	0	0.0	14	17.7	7	58.3	21	10.1	
Combined injury									
Fingernails	68	57.6	66	83.5	8	66.7	142	67.9	<0.01
Toenails	62	52.5	63	79.8	8	66.7	133	63.6	<0.01
Joints	33	28.0	28	35.4	4	33.3	65	31.1	0.53
Therapy									
Topical	49	41.5	17	21.5	3	23.1	69	32.9	0.01
Secukinumab(Fraizeron)	5	4.2	2	2.5	1	7.7	8	3.8	0.62
Cyclosporin	3	2.5	4	5.1	2	15.4	9	4.3	0.09
UVA/UVB	6	5.1	3	3.8	2	15.4	11	5.2	0.22
Methotrexate	39	33.1	28	35.4	5	38.5	72	34.3	0.89
Acitretin(Fellaini)	22	18.6	28	35.4	1	7.7	51	24.3	<0.01
Adalinumab(Humira)	0	0.0	1	1.3	0	0.0	1	0.5	0.44
Elevated Cholesterol	55	46.6	40	50.6	6	46.2	101	48.1	0.85
Elevated Triglycerid	54	45.8	51	64.6	7	53.9	112	53.3	0.04
Reduced HDL-C	39	33.1	22	27.9	6	46.2	67	31.9	0.39
Elevated LDL-C	68	57.6	50	63.3	9	69.2	127	60.5	0.58

Table 3: Factors associated with PASI score and severity

Characteristics	PASI score	
	Coef.	95%CI
Clinical and subclinical characteristics		
Family's history of psoriasis (Yes vs No-ref)	1.22	-0.31 - 2.75
Duration of disease (per year)	0.07*	0.01 - 0.12
Type of psoriasis (Plaque vs. Guttate-ref)	2.38*	0.71 - 4.04
Elevated triglyceride (Yes vs. No-ref)	1.07*	0.04 - 2.11
Elevated LDL (Yes vs. No-ref)	1.14*	0.09 - 2.18
Itch (Yes vs. No-ref)	2.78*	1.34 - 4.23
Pain (Yes vs. No-ref)	4.03*	2.48 - 5.58
Skin redness (Yes vs. No-ref)	2.33*	0.75 - 3.91
Level of skin redness (Moderate-Severe vs None-mild-ref)	6.96*	5.70 - 8.22
Treatment		
Secukinumab (Fraizeron) (Yes vs. No-ref)	2.44	-0.26 - 5.13
Cyclosporin (Yes vs. No-ref)	3.19*	0.63 - 5.76
UVA/UVB (Yes vs. No-ref)	2.72*	0.46 - 4.98
Methotrexate (Yes vs. No-ref)	1.21*	0.09 - 2.33
Adalinumab (Humira) (Yes vs. No-ref)	-6.48	-13.81 - 0.86

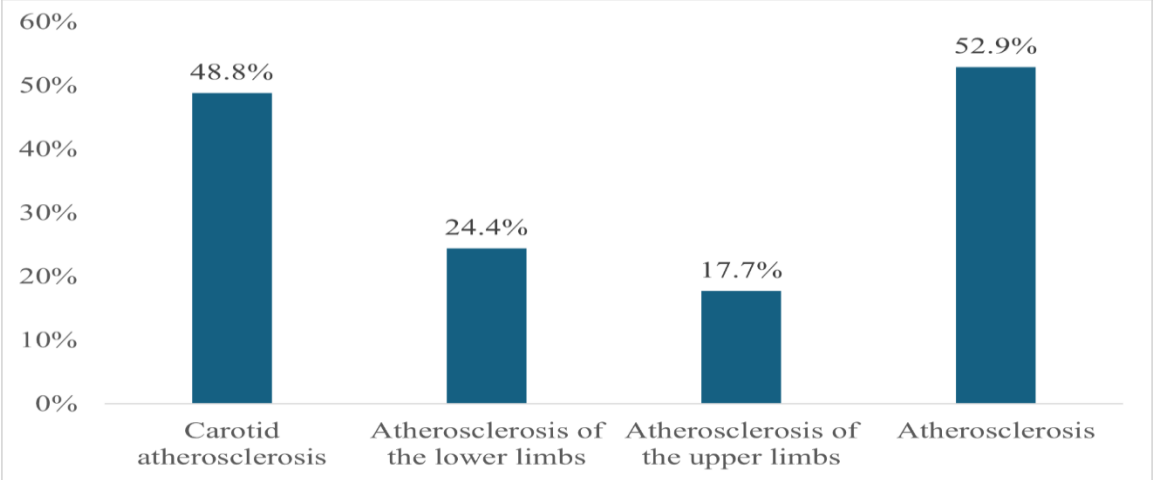
p<0.05

Table 4: Factors associated with atherosclerosis

Characteristics	OR	p-value	95%CI	
PASI score	0.95	0.09	0.90	1.01
Duration of disease (per year)	1.06	0.01	1.02	1.10
Elevated triglycerid (Yes vs. No-ref)	2.36	0.01	1.27	4.37
Combined injury in joints (Yes vs. No-ref)	2.17	0.04	1.05	4.47
Type of psoriasis (Plaque vs. Guttate-ref)	4.38	0.01	1.48	12.99
Having any comorbidity (Yes vs No-ref)	2.68	0.14	0.72	9.92
Pain (Yes vs. No-ref)	2.00	0.19	0.71	5.60
Receiving Secukinumab (fraizeron) treatment (Yes vs. No-ref)	0.31	0.19	0.05	1.78

Figure 1 illustrates that overall, 52.9% of psoriasis patients had atherosclerosis. The carotid, lower, and upper limbs atherosclerosis rates were 48.8%, 24.4% and 17.7%, respectively.

Figure 1: Rates of atherosclerosis in different positions



DISCUSSION

This study identifies various clinical and demographic factors linked to the severity of psoriasis. Moreover, we found that duration and type of psoriasis, elevated triglyceride, and combined injury in joints were associated with atherosclerosis. The results of this study may indicate the need for additional measures to create suitable treatment strategies for psoriasis and prevent CVD in Vietnamese hospital settings.

Our observations revealed a notable prevalence of moderate to severe psoriasis in the patient cohort (43.8%). This trend could be attributed to both study sites being recognised as leading dermatology hospitals in Vietnam. Contrary to a prior study conducted in Vietnam, our findings revealed that 76.4% of the participants exhibited moderate to severe psoriasis, as indicated by their PASI scores [15]. The average PASI score was calculated to be 9.6 (SD=6.1), indicating a relatively low level of psoriasis severity among the study population. This finding is likely attributed to most patients undergoing active psoriasis treatment during the study period [16]. The results of our study align with those of a previous investigation conducted in Egypt, where the average score was reported to be 8.7 ± 0.09 [17].The PASI score demonstrates variability when comparing across studies. This phenomenon may be attributed to the chronic progression of psoriasis, whereby patients present for examination at various stages of the disease. Additionally, the subjects included in our study are all undergoing outpatient treatment. Thus, the majority of the illnesses are of mild to moderate severity.

In this study, 93.3% of patients exhibited evidence of functional symptoms. The predominant clinical manifestations included skin redness (58.6%), itching (40.5%) and pain (15.7%). The study's findings differ from previous research by demonstrating that itch is present in a high proportion of patients with psoriasis, accounting for 91.3% [18]. A study conducted in Egypt showed that the predominant symptom reported by 82.4% of patients wasitching [17]. Pruritus is a prevalent symptom observed in a substantial proportion of psoriasis individuals, with prevalence rates varying between 60% and 90% depending on the specific demographic under investigation [19]. Patients often regard itching as the most discomforting symptom of psoriasis. Itching can manifest as a sensation of stinging or burning, occasionally necessitating scratching until bleeding occurs, and commonly displays most prominently during the night, leading to sleep difficulties for most affected patients [20].

The common psoriasis disease is often comorbid with various conditions such as diabetes mellitus, hypertension, dyslipidemia, gastrointestinal disorders such as peptic ulcers, and liver diseases [3]. However, our investigation has revealed a significant discovery indicating a decreased occurrence of coexisting medical conditions within the demographic of patients being analysed. The research findings showedthat 8.6% of the patients had at least one comorbidity. This finding differs from previous studies by

demonstrating a significant comorbidity burden in patients with psoriasis [15, 21, and 22]. A previous study conducted in Vietnam revealed that 59. 8% of patients in the current study had at least one comorbidity, primarily attributable to the high prevalence of dyslipidemia among the patient population [15]. The observed variation may be attributed to the relative youth of the patients in our study compared to other studies, resulting in fewer comorbidities. The concomitant diseases are primarily associated with diabetes mellitus and hypertension, consistent with prior research demonstrating the high prevalence of these conditions as comorbidities [15,21-23].

The persistent inflammatory characteristics of psoriasis have prompted a thorough exploration of potential links between psoriasis and systemic comorbidities, particularly cardiovascular events. Prior research has indicated a higher prevalence of cardiovascular risk factors among individuals with psoriasis, pointing to the potential development of atherosclerotic CVD in this patient population due to concomitant cardiometabolic abnormalities [24]. Our research findings indicate that although PASI is not correlated with atherosclerosis, various clinical and subclinical factors, such as psoriasis type and disease duration, are potential predictors for atherosclerosis. This could be attributed to the inclusion ofpatients with PASI<10 in this study, while in other studies, patients were primarily selected with PASI>10. This observation may lead to a lower incidence of arterial atherosclerosis in our research and a less severe degree of atherosclerosis. On the other hand, with the average age of the patients in this study being below 60, the risk of atherosclerosis in the arteries was also low. In literature, the impact of psoriasis on cardiovascular diseases may be less apparent in patients with higher cardiovascular risk subgroups. [25, 26]. As a result, it is crucial for individuals with severe psoriasis to effectively manage traditional cardiovascular risk factors to decrease the likelihood of experiencing life-threatening heart-related conditions.

The findings of this research must be contextualised within the parameters of the data source, study methodology, and analytical approaches utilised. This study employed a cross-sectional analysis, precluding the ability to draw causal inferences about the severity of psoriasis and its associated outcomes. The generalizability of the findings is limited due to the narrow scope of the data collection, which was confined to only two specific sites. Moreover, the sites in question were classified as tertiary centres and thus were more inclined to cater to patients with more advanced disease presentations. Consequently, individuals with less severe disease manifestations may have needed to be more adequately represented in the study population. Additionally, the lack of data from analogous studies carried out in Vietnam requires comparing and interpreting the obtained results in this study.

CONCLUSION

In conclusion, the present study provides a clinical characterisation of psoriasis in Vietnamese patients. The study findings indicated that factors such as duration and type of psoriasis, elevated triglyceride, and combined injury in joints were associated with atherosclerosis.

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