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CLINICAL CHARACTERISTICS OF ATROPHIC ACNE SCARS AND ASSOCIATED FACTORS: A SINGLE-CENTER STUDY

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ABSTRACT

Objective: Investigation the clinical characteristics of acne scars and associated factors at the National Hospital of Dermatology and Venereology.

Materials and Methods*:* A cross-sectional observational study was conducted on 150 patients diagnosed with atrophic acne scars at the National Hospital of Dermatology and Venereology from August 2024 to June 2025. Patients were interviewed using a pre-designed structured data collection form to obtain information on age, sex, occupation, address, disease duration, impact on quality of life, and related factors. A clinical examination was then performed to assess scar severity using the Goodman & Baron scale, as well as to record scar location, color, and morphology.

Results: 54% patients are female. The mean age of patients was 26.5 ± 6.3 years. The average duration of acne was 63.4 ± 36.9 months, and that of scarring was 82.1 ± 57.5 months. The most common occupations were students (36.0%), followed by office workers (19.3%) and businesspeople (13.3%). Regarding scar severity, 48.0% of patients had grade 4 (severe) scars, 34.7% grade 3, and 17.3% grade 2; no cases were classified as grade 1. All patients had facial scars, with the cheeks being the most commonly affected site (93.3%) and the chin being the least (24.7%). Ice-pick scars were the most frequent type (61.3%), while rolling scars presented in the minority of our cohort (18%). The predominant scar color was normal skin tone (56.7%). All patients reported being affected by their scars. There was a statistically significant difference

between scar severity and acne severity, duration of acne, and behaviors such as squeezing/picking at lesions ($p < 0.001$).

Conclusions: Atrophic acne scars are common in young individuals and have a substantial impact on patients's quality of life. The severity of scarring was significantly associated with the severity and duration of acne, as well as behavioral factors such as lesion picking. These findings highlight the need for early intervention and education on acne management and skin care.

Keywords*: atrophic acne scars, clinical characteristics, associated factors.*

I. INTRODUCTION

Atrophic acne scars are a common complication of acne, typically forming within and around inflamed pilosebaceous units. Following the inflammatory process, acne may result in various sequelae including post-inflammatory hyperpigmentation, atrophic scars, hypertrophic scars, keloids, and sinus tracts. Acne scarring can affect individuals of both sexes and all ethnicities; among these, facial and cervical acne scars are reported in up to 95% of acne patients.[1] Atrophic scars account for approximately 80 – 90% of all acne scars.[2–5] Despite being indolent, acne scars particularly those on the face pose significant aesthetic and psychological burdens, contributing to decreased self-esteem, impaired social interactions, and reduce quality of life and work productivity. To improve treatment outcomes and enhance the prevention of atrophic acne scars, we conducted a study at the National Hospital of Dermatology and Venereology (Vietnam) from August 2024 to June 2025 with the objective: "Investigate the clinical characteristics of atrophic acne scars and associated factors at the National Hospital of Dermatology and Venereology."

2. SUBJECTS AND METHODS

2.1. Subjects

A total of 150 patients diagnosed with atrophic acne scars were recruited at Laser and Skin Care Department, the National Hospital of Dermatology and Venereology from August 2024 to May 2025.

Inclusion criteria: All patients with atrophic acne scars who agreed to participate in the study.

Exclusion criteria: None.

2.2. Methods

Study design: Cross-sectional observational study. Sample size: 150 patients presenting with atrophic acne scars. Sampling method: Convenience sampling

Materials and study Procedures: Information on the clinical characteristics of the study participants was collected. Patients were interviewed using a pre-designed structured data collection form to obtain data on age, sex, occupation, address, disease duration, and the degree of impact on quality of life. Information on related factors was also collected. Clinical

examination was performed to assess scar severity according to the Goodman & Baron scale, as well as scar location, color, and morphology. Data were then entered and analyzed.

Data were analyzed using SPSS version 20.0. Statistical significance was set at $p < 0.05$.

2.3. Ethical approval

The study was approved by the Ethics Committee of the National Hospital of Dermatology and Venereology and the Ethics Committee of Hanoi Medical University. All participants provided written informed consent after being fully informed about the study's objectives and procedures.

3. RESULTS

Table 1. Demographic and clinical characteristics of patients with acne scars

Characteristics (N=150)		No. cases	Percentage (%)
Gender	Male	69	46
	Female	81	54
Age (years) ($\bar{X}$ ± SD)		26.5 ± 6.3	
Place of Residence	Urban areas	100	66.7
	Rural areas	50	33.3
Occupation	Students	54	36.0
	Office workers	29	19.3
	Businesspersons	20	13.3
	Others	46	31.4
Duration of acne (months) ($\bar{X}$ ± SD)		63.4 ± 36.9	
Duration of atrophic scars (months) ($\bar{X}$ ± SD)		82.1 ± 57.5	

54% of patients presenting with atrophic acne scars were femal. The mean age of patients was 26.5 ± 6.3 years. Students predominated the cohort (36%), while office workers made up only 19.3%. Patients residing in urban areas accounted for 66.7%, which was twice as high as those from rural areas (33.3%). The average duration of acne prior to scarring was 63.4 ± 36.9 months, while the average duration of atrophic scarring was 82.1 ± 57.5 months.

Table 2. Atrophic scar characteristics

Characteristics (N=150)		No. cases	Percentage (%)
Severity of scars	Grade 1	0	0
	Grade 2	26	17.3
	Grade 3	52	34.7
	Grade 4	72	48.0
Location	Cheeks	140	93.3
	Forehead	102	68.0
	Temples	101	67.3
	Nose	64	42.7
	Chin	37	24.7
	Jawline	45	30.0
Scar morphology	Icepick scars	136	90.7
	Boxcar scars	120	80,0
	Rolling scars	97	64.7
Scar color	Normal skin color	85	56.7
	Erythematous scars	34	22.7
	Hyperpigmented dark scars	31	20.7

Grade 4 atrophic acne scars (the most severe type) were predominant, accounting for 48% of patients with post-acne scarring who presented for examination and treatment. No patients had grade 1 scars (post-inflammatory hyperpigmentation or erythema without true atrophy). Among facial locations affected by atrophic scars, the cheeks (93.3%), forehead (68.0%), and temples (67.3%) were the most commonly involved. The chin was the least affected site, with a prevalence of only 34.7%. The most frequent morphological type of atrophic scar was icepick scars, observed in 90.7% of cases. In terms of pigmentation, skin-colored scars were the most prevalent (56.7%), followed by erythematous (22.7%) and hyperpigmented lesions (20.7%).

Table 3. Degree of impact on quality of life

Level of impact	N=150	%
Severe	50	33.3
Moderate	73	48.7
Mild	27	18.0
No impact	0	0

All patients with atrophic acne scars (100%) reported an impact on their quality of life. The highest proportion (48.7%) experienced a moderate level of impact, while only 18.0% reported a mild impact.

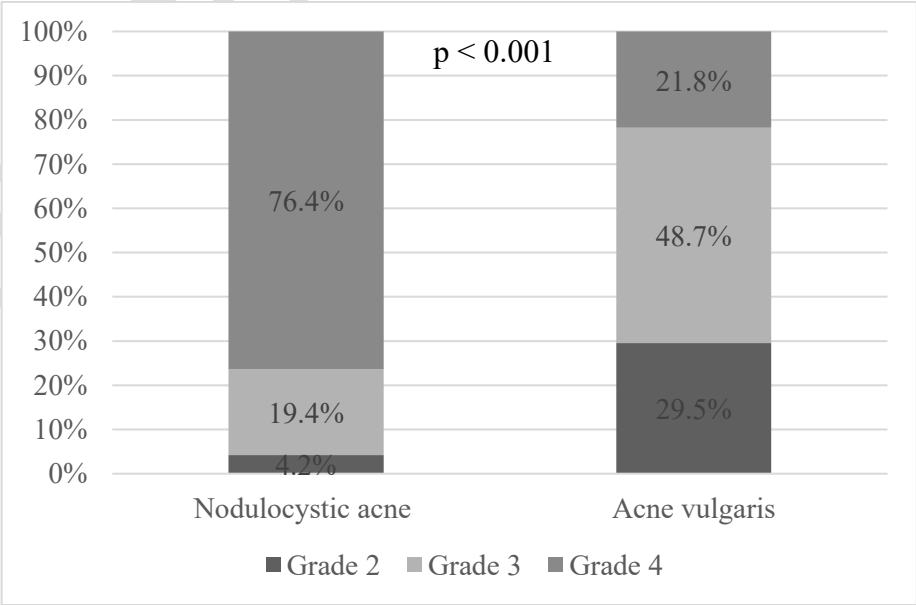

Figure 1. Severity of acne scar by previous acne severity

There was a statistically significant difference in atrophic acne scar severity between patients with nodulocystic acne and those with acne vulgaris ($p < 0.001$). Grade 4 atrophic scars were observed in 76.4% of patients with nodulocystic acne, significantly higher than in the acne vulgaris group (21.8%). Conversely, among patients with acne vulgaris, grade 2 scars accounted for a relatively high proportion (29.5%), approximately seven times greater than that in the nodulocystic acne group (4.2%).

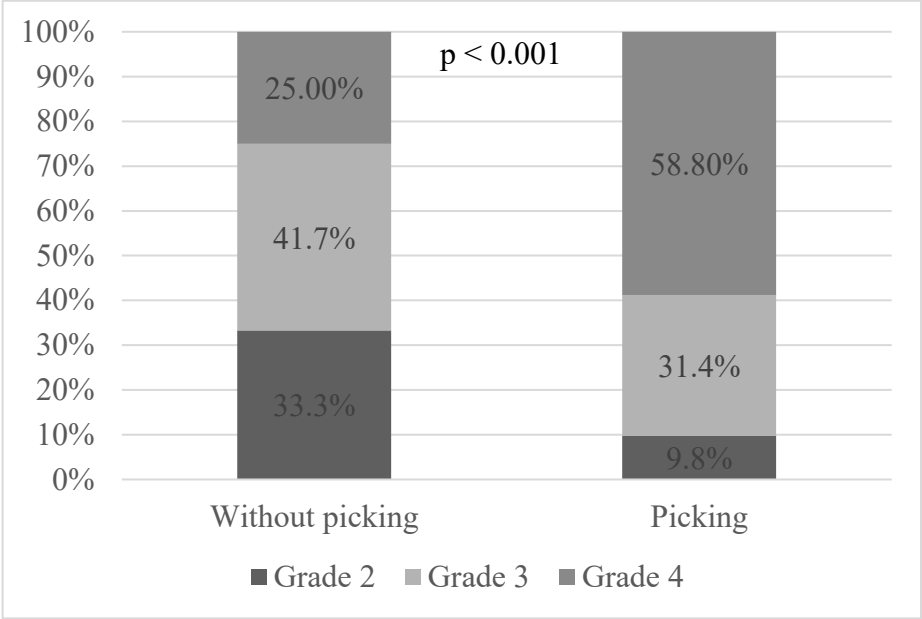

Figure 2. Severity of atrophic acne scars by previous acne squeezing behavior

Among patients with the behavior of picking or squeezing acne lesions, the proportion of grade 4 atrophic scars was the highest, accounting for 58.8% - 2.4 times higher than in those without this habit (25.0%). This difference was statistically significant ($p < 0.001$).

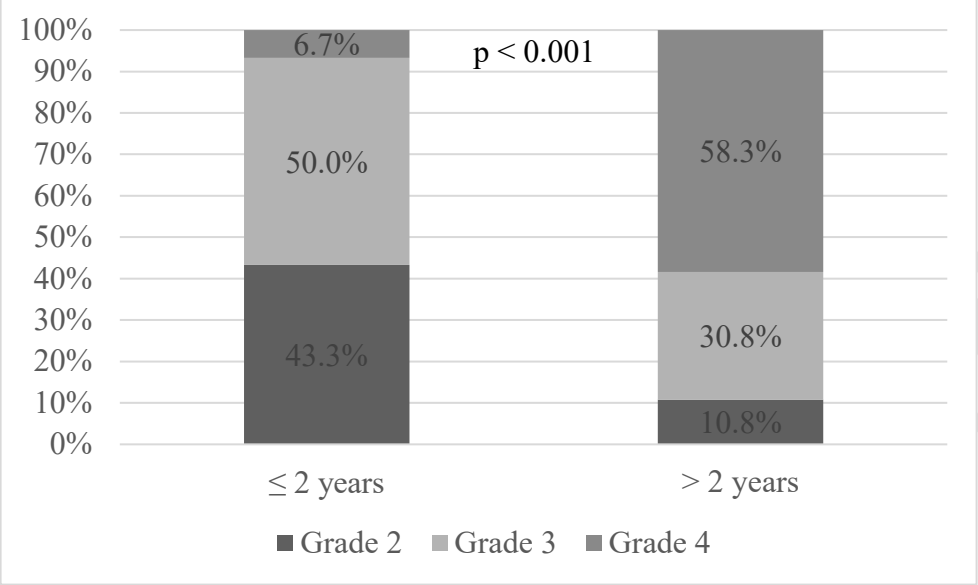

Figure 3. Severity of atrophic acne scars by acne duration

The severity of atrophic acne scars was significantly greater in the group with a history of acne lasting ≥ 2 years compared to those with acne duration < 2 years ($p < 0.001$). Notably, the proportion of patients with grade 4 atrophic scars was considerably higher in the ≥ 2-year acne group (58.3%) compared to the < 2-year group (6.7%).

4. DISCUSSION

The average age of patients with atrophic acne scars in our study was 26.5 ± 6.3 years, which is comparable to the findings of Nguyen Thi Kim Cuc's study with the mean age of, 26.7 ± 6.4 years.[6] This result is also consistent with several international studies and slightly higher than the age of acne onset reported in previous research. Scarring can occur early in acne patients and is associated with disease severity, treatment modalitis, and individual predisposition. Moreover, this average age group is often more socially active and aesthetically conscious, which may explain their higher rates of seeking medical consultation and treatment compared to other age groups.

Our study showed that the majority of patients with atrophic acne scars were female, accounting for 54%. This finding is consistent with other studies on acne scarring. For instance, a study by Sai Yee Chuah involving 100 patients with acne scars reported that females accounted for 57% of the cases.[7] This discrepancy may be attributed to the fact that females tend to be more

sensitive and concerned about their appearance, with higher aesthetic demands compared to males.

Most patients with acne scars were students (26.5%) and office workers (19.3%). These groups are frequently exposed to academic or occupational stress, tend to stay up late, and often neglect proper skincare. Additionally, hormonal changes during adolescence, a tendency to delay treatment, and the habit of squeezing acne lesions may exacerbate the severity of acne. The occupational distribution of patients in our study is consistent with a Singaporean study involving 100 patients, in which office workers and students accounted for 31% and 22%, respectively.[7]

The proportion of patients residing in urban areas was predominant, accounting for 66.7%. This result may be explained by differences in healthcare-seeking behavior, psychological factors, economic conditions, and level of awareness. Patients living in urban settings generally have a more available access to dermatological services and are more likely to seek treatment compared to those in rural areas.

In our study, patients presenting with acne atrophic scars were predominantly in the most severe categories, with 48% classified as grade 4 and 34.7% as grade 3. This proportion is considerably higher than that reported in several other studies. Other studies have indicated that severe acne scars (grade 4) account for, at most, 30% of cases.[8] This discrepancy may be attributed to the fact that our study only included patients who sought consultation and treatment, which may not accurately reflect the true distribution of acne scar severity in the general population.

Ice pick scars were the most prevalent type, accounting for 90.7%, whereas rolling scars were the least common at 64.7%. Most patients presented with more than one type of atrophic acne scar on the face. This finding aligns with several studies, which have reported similar pattern. Large-scale studies consistently demonstrate that ice pick scars are present approximately 60% – 70% of all acne scars, while rolling scars 15% – 25%, and boxcar scars 20% – 30%.[9]

Atrophic acne scars predominantly affect the facial area, especially the cheeks (93.3%) and forehead (68.0%). No cases of extrafacial scarring were recorded. This finding can be explained by the fact that acne lesions commonly occur in sebaceous gland-rich areas, with the face being the most affected site. The anatomical and physiological characteristics of the pilosebaceous unit

on the face are distinct, as sebaceous glands are distributed more densely approximately five times more than in other body regions, and sebaceous cells themselves are also larger. Moreover, facial skin is exposed daily to environmental factors such as dust and pollution, increasing the risk of secondary infection and subsequent scar formation. Our findings are consistent with previous studies; notably, a 2015 study on 100 patients with acne scars reported that all cases of atrophic scarring occurred exclusively on the face.[7]

As our results, the majority of acne scars exhibited a normal skin color (56.7%), followed by erythematous lesion (22.7%). This distribution may be explained by the natural progression of post-inflammatory skin changes, where scars initially appear red, may become hyperpigmented, and eventually return to a normal skin tone over time.

All patients in the current study reported an impact on quality of life, predominantly at moderate to severe levels. This is likely because atrophic acne scars commonly occur on the face. While these scars do not directly affect physical well-being, they have a significant psychological and social impact on patients.

There was a significant difference in the severity of atrophic acne scars based on the initial severity of acne. Grade 4 scars were markedly more prevalent in the nodulocystic acne group (76.4%) compared to the acne vulgaris group (21.8%) ($p < 0.001$). Conversely, grade 2 scars accounted for only 4.2% in the nodulocystic group, much lower than in the acne vulgaris group (29.5%). These findings are consistent with previous studies. In a 2017 study, Tan et al. also identified acne severity as the strongest risk factor for the development of atrophic scars, with an odds ratio (OR) of 3.68 (95% CI: 2.58 – 5.23).[10] In nodulocystic acne, the predominant lesions are nodules and cysts, which cause more extensive tissue destruction, resulting in a higher risk and greater severity of atrophic scarring compared to acne vulgaris. Therefore, all forms of acne should be treated early and adequately to prevent scarring and long-term complications.

Grade 4 atrophic acne scars were observed in 58.8% of patients with a habit of picking or squeezing acne lesions, which was 2.4 times higher than in those without this manner ($p < 0.001$). Many patients engage in lesion picking or inappropriate self-treatment in the hope of accelerating acne resolution; however, such behaviors often exacerbate the condition and increase the risk of scarring. This mechanical trauma facilitates the formation of permanent scars. In a study by Tan

et al., acne lesion picking was identified as a strong risk factor for atrophic scar formation, with an odds ratio (OR) of 1.7 (95% CI: 1.27 – 2.29).[10]

Grade 4 atrophic acne scars were observed in 58.3% of patients with a history of acne lasting more than 2 years, significantly higher than in those with acne duration less than 2 years (6.7%) ($p < 0.001$). Acne duration was identified as a strongly associated factor in post-acne scarring. Tan et al. reported an odds ratio (OR) of 1.64 (95% CI: 1.09 – 2.47) for the association between acne duration and scarring, indicating a substantial effect second only to lesion-picking behavior and acne severity [10]. The longer the inflammatory process persists, the higher the risk of scar formation and the greater the severity of the resulting scars.[11]

5. CONCLUSIONS

Atrophic acne scars are a common complication among young individuals and have a substantial impact on patients's quality of life. The severity of scarring is clearly associated with the severity and duration of acne, as well as behavioral factors such as lesion picking or squeezing. These findings highlight the importance of early therapeutic intervention and patient education on appropriate acne care to minimize long-term scarring.

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