Journal of Society Medicine
Research & Review Articles on Diseases
*Journal of Society Medicine. 2025; 4 (1)*

# Comparison of Adiponectin Levels in Patients with Familial and Non-Familial Keloid History

Ella Finarsih ES[1*], Imam Budi Putra[2], Meidina Kesuma Wardani[3]

[1]*Dermatology and Venereology Department, Faculty of Medicine, Universitas Sumatera Utara, Medan, Indonesia*
[2]*Dermatology and Venereology Department, Faculty of Medicine, Universitas Sumatera Utara, Medan, Indonesia*
[3]*Dermatology and Venereology Department, Faculty of Medicine, Universitas Sumatera Utara, Medan, Indonesia*

***Corresponding Author**: Ella Finarsih ES, Email: ellafinarsihes@gmail.com

**ARTICLE INFO**

*Article history:*
Received
17 November 2024

Revised
25 December 2024

Accepted
31 January 2025

Manuscript ID:
JSOCMED 17112024-41-2

Checked for Plagiarism: Yes

Language Editor: Rebecca

Editor-Chief:
Prof. Aznan Lelo, PhD

**ABSTRACT**

**Introduction**: Keloid is an abnormal wound healing condition influenced by various factors, including adiponectin levels and genetic predisposition. The role of adiponectin in keloid formation, particularly concerning familial and non-familial history, remains unclear. This study aims to compare adiponectin levels in keloid patients with and without a familial history of keloid formation. To compare adiponectin levels in patients with familial and non-familial keloid history.

**Methods:** This observational analytic study utilized a cross-sectional design involving 40 keloid patients. Participants underwent anamnesis, dermatological examination, and blood sampling to measure serum adiponectin levels using enzyme-linked immunosorbent assay (ELISA). Data were analyzed descriptively using IBM SPSS Statistics version 21.

**Results**: Keloid was more frequently observed in female patients, particularly in the 18–25-year age group. The mean serum adiponectin level among all participants was 11.01±8.34 µg/ml. In patients with a familial history of keloid, 40.0% had low adiponectin levels, while 42.5% of those without a familial history also exhibited low levels. Statistical analysis revealed no significant difference in adiponectin levels between the two groups, suggesting that low adiponectin levels are a common feature in keloid patients regardless of genetic predisposition.

**Conclusion**: Low adiponectin levels are prevalent among keloid patients, but they are not significantly associated with a familial history of keloid formation. Further research is needed to explore the mechanisms linking adiponectin to keloid development.

**Keywords**

Adiponectin, Familial History, Keloid, Lipid.

***How to cite***: Finarsih E ES, Putra IB, Wardani MK Comparison of Adiponectin Levels in Patients with Familial and Non-Familial Keloid History. *Journal of Society Medicine*. 2025;4(1):8-12. **DOI: https://doi.org/10.71197/jsocmed.v4i1.188**

## INTRODUCTION

Keloid is an abnormal wound healing process characterized by fibroproliferation and scar tissue formation that extends beyond the wound margins, involving excess fibroblasts and extracellular matrix components such as collagen, fibronectin, and growth factors (GF).[1]

Keloids are most common in the second and third decades of life and affect both genders equally, although women seek treatment more often due to cosmetic concerns.[2-5] Incidence varies geographically, with rates ranging from 0.09% in the UK to 16% in Zaire and higher prevalence among African populations (5–10%) compared to Asians (0–0.1%).[6] A study in 2021 reported 105 keloid cases among 382 dermatological cases at Dr. Soetomo Hospital, Surabaya, and another study found 90% of keloid patients at Haji Adam Malik Hospital had a history of trauma. Genetic factors play a role, with 50% of patients reporting a family history of keloids.[7-9] Keloid formation involves persistent inflammation due to abnormal wound healing, influenced by local factors like delayed healing and wound depth, and systemic factors such as

adolescence, pregnancy, and hypertension. Inflammatory cells and cytokines, including GF, drive fibroblast activity and excess matrix deposition.[10,11]

Changes in lipid metabolism, especially involving adipose tissue, contribute to keloid development. Adipokines such as adiponectin and pro-inflammatory factors like vascular endothelial growth factor (VEGF) and transforming growth factor beta (TGF-β1) promote chronic inflammation, which supports keloid formation.[12,13] Adiponectin, secreted by adipose tissue, reduces inflammation and fibrosis by activating pathways like AMPK and PPAR-α. It may inhibit skin fibrosis progression, as suggested by some studies.[14-16] Although numerous studies explore the role of adiponectin in keloid formation, research on the comparison of adiponectin levels in patients with familial and non-familial keloid history remains limited, highlighting the need for further investigation

The objectives of the study were to determine the comparison of adiponectin between familial and non-familial keloid history, to identify the characteristics of keloid patients based on age, gender, and family history, and to measure adiponectin levels in keloid patients.

## METHOD

The study population consisted of keloid patients visiting the Puskesmas Padang Bulan Medan from January 2024 until the sample size was met (involving 40 keloid individuals). The study population consisted of keloid patients visiting the Puskesmas Padang Bulan Medan from January 2024 until the sample size was met (involving 40 keloid individuals). Inclusion criteria included: patients diagnosed with keloids through history-taking and clinical examination, age ⩾18 years, and willingness to participate by signing informed consent. Exclusion criteria included patients with metabolic syndrome and those taking antihyperlipidemic medication.

This study was an observational analytic study with a cross-sectional design. The Ethical Committee of University of Sumatera Utara University approved of the study protocol with the number 271/KEPK/USU/2024 and a research permit from the Medan City Health Service. The researcher informed each participant about the purpose of the study. Furthermore, all participants were informed of their rights to refuse or to discontinue their participation, according to the ethical standards of the Helsinki Declaration of 1983.

This study was an observational analytic study with a cross-sectional design. The Ethical Committee of University of Sumatera Utara University approved of the study protocol with the number 271/KEPK/USU/2024 and a research permit from the Medan City Health Service. The researcher informed each participant about the purpose of the study. Furthermore, all participants were informed of their rights to refuse or to discontinue their participation, according to the ethical standards of the Helsinki Declaration of 1983. The data in this study used primary data from anamnesis, dermatological examination, and followed by blood sampling to assess adiponectin levels using ELISA testing. Adiponectin levels are defined as low if <11,8 µ g/ml and high if ⩾11,8 µ g/ml. The characteristics assessed in this study included demographic characteristics (gender, age, and family history), adiponectin levels, and comparison of adiponectin levels in patients with familial and non-familial keloid history. The data collected will be described using IBM SPSS Statistics version 21 and analyzed descriptively using a frequency distribution table.

## RESULTS

The study included 40 keloid patients who visited Padang Bulan Health Clinic in Medan. All participants underwent anamnesis, physical examination, dermatological assessment, and blood sample analysis. Sociodemographic characteristics, including gender and age were analyzed. Most participants were female (75%). Age distribution, based on the classification by the Indonesian Ministry of Health, showed that the majority of keloid patients were aged 18–25 years (37.5%), followed by 26–35 years (25%). Family history analysis found that 55% of keloid patients reported no family history of keloid, while 25% had a maternal history, and 12.5% had siblings with keloid (Table 1).

Table 1. Demographic and Laboratory Characteristics of the Sample.

| Demographic characteristics | | n | % |
|---|---|---|---|
| Sex | Male | 10 | 25.0 |
| | Female | 30 | 75.0 |
| Age (years) | 18 – 25 | 15 | 37.5 |
| | 26 – 35 | 10 | 25.0 |
| | 36 – 45 | 11 | 27.5 |
| | 46 – 55 | 3 | 7.5 |
| | 56 – 65 | 1 | 2.5 |
| Family History | Paternal | 4 | 10.0 |
| | Maternal | 10 | 25.0 |
| | Siblings | 6 | 15.0 |
| | None | 20 | 50.0 |

This study also looked at the results of adiponectin level. The following are the results of the analysis which can be seen in Table 2. The study showed that the mean adiponectin level in keloid patients was 11.01±8.34 µg/ml. Low adiponectin levels were found in most keloid patients (33 participants, 82.5%), while high levels were observed in 7 participants (17.5%).

Table 2. Adiponectin Levels in Keloid Patients.

| | n |
|---|---|
| Adiponectin level, mean (±) | 11.01 (8.34) |
| Low, n(%) | 33 (82.5) |
| High, n(%) | 7 (17.5) |

This study also aims to determine the comparison of adiponectin levels in patients with keloid. This study is divided into 2 groups, namely familial and non-familial keloid history. After the analysis, the following results were obtained which can be seen in Table 3. In this study, adiponectin levels in patients with familial and non-familial keloid history shows that low adiponectin levels are predominant in both groups, with 40.0% of patients with familial keloid history and 42.5% of patients with non-familial history exhibiting low levels. Meanwhile, high adiponectin levels were observed in 10.0% of the familial group and 7.5% of the non-familial group.

Table 3. Comparison of Adiponectin Levels in Patients with Familial and Non-Familial Keloid History.

| Group | n | % |
|---|---|---|
| Familial Keloid History | | |
| Low | 16 | 40.0 |
| High | 4 | 10.0 |
| Non-Familial Keloid History | | |
| Low | 17 | 42.5 |
| High | 3 | 7.5 |

## DISCUSSION

The aim of the present study was to investigate the comparison of adiponectin levels in patients with familial and non-familial keloid history. Findings highlight that low adiponectin levels are a common feature in keloid patients but do not necessarily have a familial link, suggesting that both genetic and non-genetic factors may contribute to keloid formation.

A study by Damanik, Putra, and Ginting in 2019 in Medan found that 62.5% of patients had no family history of keloid, while 37.5% had a family history of keloid.[17] Similarly, Shaheen et al. in 2016 in Syria reported that only 19.3% of their study participants had a family history of keloid.[18] Lu et al. in 2015 in China analyzed 715 subjects with keloid and found that 72.2% had no family history, while 27.8% had a family history of keloid.[19] Conversely, Narayana et al. in 2019 in Bali reported that 54.55% of patients had a family history, while 45.45% had no family history of keloid.[20]

A family history of keloid supports the role of genetics in keloid formation, evidenced by the autosomal dominant inheritance pattern, associated loci (chromosomes 2q23 and 7p11), specific HLA alleles (HLA-DRB1*15, HLA-DQA1*0104, DQB1*0501, and DQB1*0503), and dysregulation of 25 genes involved in key pathways of keloid development, including apoptosis, mitogen-activated protein kinase, TGF-β, IL-6, and plasminogen activator inhibitor-1.[20-22] In 2017, Luo et al. explored the effects of adiponectin on connective tissue growth factor (CTGF)-induced cell proliferation, migration, extracellular matrix (ECM) deposition, and intracellular signaling in keloid fibroblasts. Using immunohistochemistry, immunofluorescence, and RT-PCR, they found that adiponectin and its receptors (adipoRs) were significantly lower in keloid tissue compared to normal skin. Adiponectin inhibited CTGF-induced fibroblast activity, including proliferation, migration, and ECM production, through adipoR1, AMPK, and p38 signaling pathways.[16] Similarly, Luo et al. in 2021 showed reduced serum adiponectin and mRNA expression in keloid patients, alongside increased TGF-β1, CTGF, IL-6, and TNF-α levels, with adiponectin suppressing TGF-β1-mediated collagen I and fibronectin expression.[23] Darmawan et al. further investigated the adiponectin-based peptide ADP355, which enhanced AMPK phosphorylation in keloid fibroblasts and reduced TGF-β1-induced procollagen expression.[14]

## CONCLUSION

Overall, this study highlights the comparison of adiponectin levels in patients with familial and non-familial keloid history. The data suggest that low adiponectin levels are predominant in keloid patients regardless of familial history. This comparison highlights the potential role of adiponectin in keloid pathogenesis, therapeutic strategies targeting adiponectin, and offering avenues for keloid management and prevention with further investigation needed to clarify its differential impact based on family history.

## DECLARATIONS

Ethics approval and consent to participate. Permission for this study was obtained from the Ethics Committee of Universitas Sumatera Utara and Haji Adam Malik General Hospital.

## CONSENT FOR PUBLICATION

The Authors agree to publication in Journal of Society Medicine.

## FUNDING

None

## COMPETING INTERESTS

The authors declare that there is no conflict of interest in this report.

## AUTHORS' CONTRIBUTIONS

All authors significantly contribute to the work reported execution, acquisition of data, analysis, and interpretation, or in all these areas. Contribute to drafting, revising, or critically reviewing the article. Approved the final version to be published, agreed on the journal to be submitted, and agreed to be accountable for all aspects of the work.

## ACKNOWLEDGMENTS

None

## REFERENCE

1. Huang C, Akaishi S, Hyakusoku H, Ogawa R. Are keloid and hypertrophic scar different forms of the same disorder? A fibroproliferative skin disorder hypothesis based on keloid findings. Int Wound J. 2014; 11: 517-522.

2. Ghazawi FM, Zargham R, Gilardino MS, Sasseville D, Jafarian F. Insights into the pathophysiology of hypertrophic scars and keloids: How do they differ? Adv Skin Wound Care. 2018; 31: 582-595.
3. Sinto L. Scar hipertrofik dan keloid: Patofisiologi dan penatalaksanaan. Cermin Dunia Kedokteran. 2018; 45: 29-32.
4. Noishiki C, Hayasaka Y, Ogawa R. Sex differences in keloidogenesis: An analysis of 1659 keloid patients in Japan. Dermatol Ther (Heidelb). 2019; 9: 747-754.
5. Wang Y, Hunt K, Nazareth I, Freemantle N, Petersen I. Do men consult less than women? An analysis of routinely collected UK general practice data. BMJ Open. 2013; 3: 1-18.
6. Huang C, Wu Z, Du Y, Ogawa R. The epidemiology of keloids. In: Textbook on Scar Management. Springer International Publishing; 2020: 1: 29-35.
7. Wardani FA, Perdanakusuma DS, Diah Mira Ind. Profile of working-age patients with keloid and hypertrophic scar at Dr. Soetomo General Hospital Surabaya in 2014-2017. JUXTA: Jurnal Ilmiah Mahasiswa Kedokteran Universitas Airlangga. 2021; 12: 77-83.
8. Putra IB, Jusuf NK. Studi retrospektif keloid di Poliklinik Kulit dan Kelamin RSUP H. Adam Malik Medan. In Role of Dermatovenereology in Environmental and Occupational Health Program Book and Abstract. 12th Asia Pacific Environmental and Occupational Dermatology Symposium. 2013; 10: 23-26.
9. Gauglitz GG, Korting HC, Pavicic T, Ruzicka T, Jeschke MG. Hypertrophic scarring and keloids: Pathomechanisms and current and emerging treatment strategies. Mol Med. 2011; 17: 113-125.
10. Ogawa R, Akaishi S. Endothelial dysfunction may play a key role in keloid and hypertrophic scar pathogenesis – Keloids and hypertrophic scars may be vascular disorders. Med Hypotheses. 2016; 96: 51-60.
11. Shih B, Garside E, McGrouther DA, Bayat A. Molecular dissection of abnormal wound healing processes resulting in keloid disease. Wound Repair Regen. 2010; 18: 139-153.
12. Shakespeare PG, Strange RE. Linoleic acid in hypertrophic scars. Burns. 1982; 9: 7-12.
13. Isoldi F. Is the increase of body mass index (BMI) a risk factor for keloid? Clin Dermatol Open Access J. 2016; 1: 1-9.
14. Darmawan CC, Montenegro SE, Jo G, Yun IS, Lee WJ, Tark KC. Adiponectin-based peptide (ADP355) inhibits transforming growth factor-β1-induced fibrosis in keloids. Int J Mol Sci. 2020; 21: 1-8.
15. Achari AE, Jain SK. Adiponectin, a therapeutic target for obesity, diabetes, and endothelial dysfunction. Int J Mol Sci. 2017; 18: 1-44.
16. Luo L, Li J, Liu H, Wu Y, Fang H. Adiponectin is involved in connective tissue growth factor-induced proliferation, migration and overproduction of the extracellular matrix in keloid fibroblasts. Int J Mol Sci. 2017; 18: 1-5.
17. Damanik VI, Putra IB, Ginting O. Correlation between serum 25-hydroxyvitamin D levels with keloid severity. Open Access Maced J Med Sci. 2019; 7: 65-67.
18. Shaheen A. Comprehensive review of keloid formation. J Clin Res Dermatol. 2017; 4: 1-18.
19. Lu W sheng, Zheng X dong, Yao X hua, Zhang L fang. Clinical and epidemiological analysis of keloids in Chinese patients. Arch Dermatol Res. 2015; 307: 109-114.
20. Narayana IGR, Praharsini IGAA, Rusyati LMM. Profil Derajat Keparahan Keloid pada Mahasiswa Fakultas Kedokteran Universitas Udayana Tahun 2015. E-jurnal Medika. 2019; 8: 82-91.
21. Glass DA, Bayat A, McGrouther DA, Ogawa R, Akaishi S, Garside E. Current Understanding of the Genetic Causes of Keloid Formation. J Invest Dermatol Symp Proc. 2017; 18: 50-53.
22. Shih B, Bayat A. Genetics of keloid scarring. Arch Dermatol Res. 2010; 302: 319-339.
23. Luo L, Li J, Wu Y, Qiao J, Fang H. Adiponectin, but not tgf-β1, ctgf, il-6 or tnf-α, may be a potential anti-inflammation and anti-fibrosis factor in keloid. J Inflamm Res. 2021; 14: 907-916.