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Triglyceride glucose index: a novel biomarker in the management of patients with psoriasis

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Abstract. – OBJECTIVE: Triglyceride glucose index is a recently described biomarker that has been associated with various systemic disorders such as cardiovascular diseases. Within this study, we evaluated the effect of biological agent treatment on triglyceride glucose index in patients with psoriasis.

PATIENTS AND METHODS: Between April 2019 and October 2022, the triglyceride glucose index was retrospectively reviewed in patients with psoriasis before and three months after the initiation of biological agent treatment.

RESULTS: This study included 91 patients, 37 females and 54 males, with a mean age of 46.27±12.39 years. The mean triglyceride glucose index in patients with and without psoriatic arthritis was 8,137.20±5,294.01 and 6,310.04±3,341.63, respectively (p=0.047). The median triglyceride glucose index in all patients before and after biological agent treatment was 6,048 (4,597) and 5,095.5 (4,123), respectively (p=0.003). When evaluated according to the treatment groups, the decrease in triglyceride glucose index after treatment was statistically significant only in patients treated with tumor necrosis factor-alpha (TNF-α) inhibitors (p=0.026).

CONCLUSIONS: Since triglyceride glucose index has been associated with atherosclerosis in psoriasis, treatment with TNF-α inhibitors might indicate a positive impact in psoriasis patients, especially with increased risk for cardiovascular diseases. Furthermore, the triglyceride glucose index was significantly higher in patients with psoriatic arthritis compared to those without arthritis. Therefore, we suggest that triglyceride glucose index may be used as a novel diagnostic biomarker in patients with psoriatic arthritis.

Key Words:
Biological agent, Biomarker, Cardiovascular diseases, Psoriasis, Psoriatic arthritis, Triglyceride Glucose index.

Introduction

Psoriasis is a common chronic inflammatory skin disease that affects up to 3% of people worldwide[1]. Patients with psoriasis tend to develop systemic comorbidities such as cardiovascular diseases, psoriatic arthritis, obesity, metabolic syndrome, and psychological disorders. Therefore, a higher mortality rate has been reported in patients with psoriasis than in the general population[1,2]. Chronic inflammation has been regarded as the shared etiologic factor in the development of both psoriasis and its systemic comorbidities. It has been suggested[1] that disease control might lead to a positive impact on comorbidities such as cholesterol levels and atherosclerosis. For instance, treatment of psoriasis with tumor necrosis factor-alpha (TNF-α) inhibitors has been related[1] to decreased risk for cardiovascular diseases.

Triglyceride glucose index is an easily performed biomarker used to detect insulin resistance or diabetes. However, the triglyceride glucose index has been proposed[3-6] as a novel biomarker that might be associated with various diseases such as metabolic syndrome, non-alcoholic fatty liver disease, pulmonary disease, stroke, and cardiovascular diseases, as well as a higher risk for cardiovascular mortality. Recently, it has been reported[7,8] that triglyceride glucose index might indicate atherosclerosis in patients with psoriasis and psoriatic arthritis.

Several biological agents are available as effective treatment options for psoriasis. Since decreasing inflammation by early and successful treatment of psoriasis may have a preventive role in cardiometabolic diseases and permanent joint damage, it is crucial to establish the risk of comorbidities as soon as possible and to initiate appropriate treatment[9]. Although needed, no specific biomarker has been recommended[9,10] to determine the risk for disease progression and treatment response in psoriasis. Within this study, we evaluated the effect of biological agent treatment on triglyceride glucose index to identify the usefulness of this novel biomarker in the management of patients with psoriasis in clinical practice.

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Patients and Methods

Gazi University Ethics Committee approval was obtained for this study (approval number: 2022-983). Between April 2019 and October 2022, medical records of patients with psoriasis aged 18 years and over who were treated with biological agents were reviewed retrospectively. Psoriasis type, disease duration, psoriasis area and severity index (PASI)[11], comorbidities, accompanying psoriatic arthritis, previous psoriasis treatments, and current biological agent treatments were evaluated. In addition, serum triglyceride and glucose levels, which were obtained from a biochemistry panel performed before and three months after the initiation of biological agent treatment, were evaluated. PASI <10 was considered mild/moderate, and PASI >10 was considered severe psoriasis[12]. Triglyceride glucose index was calculated using the formula as fasting triglyceride level (mg/dL) × glucose level (mg/dL)/2[13]. Patients with diabetes and patients using cholesterol-lowering medication were excluded from the study.

Statistical Analysis

Statistical analysis was performed using SPSS version 20.0 (IBM Corp., Armonk, NY, USA). Quantitative variables were stated as mean±standard deviation or median (interquartile range), and categorical variables as counts and percentages. Kolmogorov-Smirnov test was used to determine whether continuous variables were normally distributed. Wilcoxon signed-rank test, paired sample *t*-test, and independent samples *t*-test were used to evaluate differences between the groups. The *p*-value <0.05 was considered statistically significant.

Results

This study included 91 patients, 37 (40.7%) females and 54 (59.3%) males, with a mean age of 46.27±12.39 years (range: 19-74 years). 79 (86.8%) patients had psoriasis vulgaris, 7 (7.7%) patients had generalized pustular psoriasis, and 5 (5.5%) patients had palmoplantar psoriasis. The mean psoriasis duration was 18.19±11.62 years (range: 1-50 years), and the mean PASI was 12.04±7.72 (range: 2.6-49.7). 31 (34.1%) patients had psoriatic arthritis. The past medical history was unremarkable in 64 (70.3%) patients. However, hypertension was detected in 15 (16.5%) patients, chronic hepatitis B virus carriage in 5 (5.5%), coronary artery disease in 3 (3.3%), chronic obstructive pulmonary disease in 2 (2.2%) patients, depression in 1 (1.1%) and bladder cancer in 1 (1.1%) patient. All patients were previously treated with conventional medications such as methotrexate, cyclosporine, and acitretin, and 15 (16.5%) patients were treated with phototherapy. In addition, 34 (37.4%) patients previously received biological agents, whereas 57 (62.6%) patients were biologic-naive. Current treatment was TNF-α inhibitors (adalimumab, infliximab, etanercept, certolizumab pegol) in 32 (35.2%) patients, interleukin (IL)-17 inhibitors (ixekizumab, secukinumab) in 31 (34.1%) patients, IL-12/23 inhibitors (ustekinumab) in 22 (24.2%) patients and IL-23 inhibitors (risankizumab, guselkumab) in 6 (6.6%) patients.

The median triglyceride glucose index in all patients before and three months after the initiation of biological agent treatment was 6,048 (4,597) and 5,095.5 (4,123), respectively (p=0.003). The mean triglyceride glucose index before treatment in female and male patients was 6,533.91±4,490.60 and 7,205.57±3,962.08, respectively (p=0.454). The mean triglyceride glucose index before treatment in patients with and without psoriatic arthritis was 8,137.20±5,294.01 and 6,310.04±3,341.63, respectively (p=0.047) (Table I). The mean triglyceride glucose index before treatment in patients with mild/moderate and severe psoriasis was 7,614.86±4,877.37 and 6,434.64±2,201.36, respectively (p=0.180). The mean triglyceride glucose index, according to having a systemic comorbidity or receiving previous biological agent treatment, was stated in Table I. The mean triglyceride glucose index decreased in all treatment groups, such as TNF-α inhibitors, IL-17 inhibitors, IL-12/23 inhibitors, and IL-23 inhibitors. However, the decrease in triglyceride glucose index after treatment was statistically significant only in patients treated with TNF-α inhibitors (p=0.026) (Table II). The mean triglyceride glucose index before and after treatment in patients with psoriatic arthritis was 8,137.20±5,294.01 and 7,215.72±3,953.50, respectively (p=0.096). The mean triglyceride glucose index before and after treatment in patients without psoriatic arthritis was 6,310.04±3,341.63 and 5,383.99±2,927.06, respectively (p=0.004).

Table I. The mean triglyceride glucose index before biological agent treatment in patients with psoriasis.

Triglyceride glucose index (mean ± SD)		*p*-value
Female	Male	
6,533.91 ± 4,490.60	7,205.57 ± 3,962.08	0.454
With psoriatic arthritis	Without psoriatic arthritis	
8,137.20 ± 5,294.01	6,310.04 ± 3,341.63	0.047
With systemic comorbidities	Without any systemic comorbidities	
7,683.27 ± 5,405.16	6,615.74 ± 3,533.54	0.267
Previously received biological agents	Biologic naive patients	
7,685.52 ± 3,644.72	6,483.29 ± 4,429.42	0.185

SD: Standard deviation. The mean triglyceride glucose index was statistically significantly higher in patients with psoriatic arthritis compared to those without psoriatic arthritis ($p = 0.047$).

Discussion

The triglyceride glucose index has been regarded as a good indicator of insulin resistance[3]. Recently, triglyceride glucose index has been associated[3-6] with a number of disorders such as metabolic syndrome, non-alcoholic fatty liver disease, pulmonary diseases, stroke, and cardiovascular diseases. Furthermore, it has been suggested[3] that the triglyceride glucose index might indicate high mortality rates in cardiovascular diseases. On the other hand, patients with psoriasis show an increased risk for the development of systemic disorders such as psoriatic arthritis, metabolic syndrome, cardiovascular diseases, inflammatory bowel disease, and psychological disorders, and psoriasis has been accepted as a systemic inflammatory disease. These systemic disorders not only affect the quality of life negatively but also lead to increased mortality. Therefore, systemic comorbidities should be considered in the choice of treatment for patients with psoriasis[2]. For instance, psoriatic arthritis may affect 30% of patients with psoriasis and result in severe deformity and functional impairment. In most of the patients with psoriatic arthritis, joint damage occurs in the early stages. Therefore, it is of utmost importance to initiate treatment as early as possible to prevent irreversible changes in the management of psoriatic arthritis[14]. Furthermore, bearing in mind that cardiovascular comorbidities are the leading cause of higher mortality rates in patients with psoriasis, it is crucial to initiate appropriate medication to prevent the future development of cardiovascular events in high-risk populations[15].

Treatment of psoriasis with biological agents may have a protective role from cardiovascular diseases and psoriatic arthritis[16,17]. For instance, it has been suggested[18-20] that TNF-α inhibitors might modulate vascular inflammation and coronary microvascular dysfunction and decrease the risk of myocardial infarction in patients with psoriasis. Wu et al[21] reported that only six-month use of TNF-α inhibitors could significantly decrease cardiovascular events in psoriasis. Treatment with IL-12/23 and IL-17 inhibitors has also been associated[22,23] with reduced progression of coronary atherosclerosis. Within this study, the median triglyceride glucose index decreased in

Table II. Triglyceride glucose index before and three months after treatment with biological agents in patients with psoriasis.

Treatment groups	Triglyceride glucose index (mean ± SD)		*p*-value
	Before treatment	After treatment	
TNF-α inhibitors	6,340.18 ± 4,290.68	5,270.93 ± 3,404.30	0.026
IL-17 inhibitors	7,165.30 ± 3,813.45	6,395.30 ± 3,504.76	0.050
IL-12/23 inhibitor	6,582.59 ± 4,150.35	5,902.40 ± 2,951.71	0.300
IL-23 inhibitors	10,171.41 ± 4,911.28	8,324.91 ± 3,943.50	0.296

IL: Interleukin; SD: Standard deviation; TNF-α: Tumor necrosis factor alpha. Triglyceride glucose index decreased statistically significantly in patients with psoriasis three months after the initiation of treatment with TNF-α inhibitors ($p = 0.026$).

all patients significantly after biological agent treatment (p=0.003). This result might indicate the positive impact of biological agents on cardiovascular comorbidities. In addition, the mean triglyceride glucose index decreased in all treatment groups, such as TNF-α, IL-17, IL-12/23, and IL-23 inhibitors. However, the decrease in triglyceride glucose index was statistically significant only in patients who received TNF-α inhibitors (p=0.026). Since the triglyceride glucose index has been associated in the literature with cardiovascular diseases and high mortality rates in cardiovascular diseases, treatment with TNF-α inhibitors may have a positive impact on cardiovascular comorbidities in patients with psoriasis. On the other hand, within this study, no statistically significant difference was detected in triglyceride glucose index according to gender and psoriasis severity. In a recent study by O'Hagan et al[7], similar to our results, no difference was reported in triglyceride glucose index in patients with psoriasis according to sex and PASI score. However, data on triglyceride glucose index in psoriasis are scarce and evaluated only in two studies by O'Hagan et al[7] and Xie et al[8].

Furthermore, despite the need, no biomarker has been accepted to be specifically used in the diagnosis of psoriatic arthritis. It has been suggested[24] that nearly 15% of patients with psoriatic arthritis were undiagnosed. Since early treatment is crucial to prevent damage in psoriatic arthritis, novel biomarkers are required to improve the disease diagnosis[24]. Within this study, the mean triglyceride glucose index was statistically significantly higher in patients with psoriatic arthritis compared to those without arthritis (p=0.047). Our result may reveal that triglyceride glucose index may be associated with psoriatic arthritis, and it may be used as a diagnostic biomarker in psoriatic arthritis.

Conclusions

Our study is unique since we investigated the effect of biological agent treatment on triglyceride glucose index in patients with psoriasis. Within this study, the triglyceride glucose index significantly decreased in all patients three months after the biological agent treatment. However, when evaluated according to the biological agent received, a statistically significant decrease was detected only in the anti-TNF-α treatment group. Since triglyceride glucose index has been associated with atherosclerosis in psoriasis, treatment of psoriasis patients with TNF-α inhibitors might indicate a positive impact in those, especially with increased risk for cardiovascular diseases. In addition, our results revealed that the triglyceride glucose index was related to psoriatic arthritis. Therefore, we suggest that triglyceride glucose index may be used as a novel diagnostic biomarker in patients with psoriatic arthritis. We hope that our results will contribute to the literature on the potential clinical use of triglyceride glucose index in psoriatic arthritis, as the data on diagnostic biomarkers in psoriatic arthritis are still inadequate.

Conflict of Interest
The authors declare that they have no conflict of interests.

Ethics Approval
Gazi University Ethics Committee approved this study (approval number: 2022-983).

Informed Consent
Informed consent was obtained from the patients.

Authors' Contribution
Study design: FT, evaluation of data: FT, OEA, manuscript writing: FT, OEA, ABA. All authors approved the final version of the manuscript.

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Availability of Data and Materials
The data of this study are available from the corresponding author upon reasonable request.

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