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IMPACT OF TOBACCO SMOKING ON RUN OF RHEUMATIC DISEASES

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თამბაქოს მოწევის გავლენა რევმატიული დაავადებების მიმდინარეობაზე

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რეზიუმე

რევმატიული დაავადებების გავრცელება მსოფლიო მასშტაბით მზარდი ტენდენციით ხასიათდება. თამბაქოს მოწევა წარმოადგენს მნიშვნელოვან რისკ-ფაქტორს, რომელიც კავშირშია დაავადების მიმდინარეობასა და პროგრესთან. 2025 წელს ქ. ბათუმში კლინიკა „სოლომედში" ჩვენს მიერ შედგენილი კითხვარით ჩატარებულ კვლევაში მონაწილეობდა 131 პაციენტი სხვადასხვა ტიპის რევმატიული დაავადებით. კვლევამ აჩვენა, რომ აქტიურ მწეველებს ახასიათებდათ დაავადების მძიმე მიმდინარეობა, პასიურ მწეველებს – საშუალო სიმძიმის, ხოლო არამწეველებს – შედარებით მსუბუქი მიმდინარეობა. ასევე, დადასტურდა, რომ მოწევის შეწყვეტა ხელს უწყობდა დაავადების სიმპტომების შემცირებას და ზოგადი მდგომარეობის გაუმჯობესებას. თამბაქოს მოხმარების კონტროლი და პრევენცია, მნიშვნელოვანია რევმატიული დაავადებების მართვისა და პროგნოზის გაუმჯობესების თვალსაზრისით.

Introduction. According to the World Health Organization (WHO), approximately 1.3 billion people worldwide use tobacco, with cigarette smoking being the most common form. While smoking rates have declined in many high-income countries due to effective control measures, prevalence continues to rise in low- and middle-income countries. This trend is influenced by increasing tobacco use among women and youth, as well as aggressive industry marketing [1]. Smoking-related diseases are responsible for over 8 million deaths annually, with more than 7 million resulting from direct tobacco use and the remainder from second-hand smoke exposure [1]. In 2022, an estimated 844,800 individuals aged 15 and older in Georgia used tobacco products, comprising 731,400 males and 112,600 females. This places Georgia 92nd globally and 32nd in the WHO European Region in terms of tobacco users. Among youths aged 15–16, 12% were current cigarette smokers in 2019, with a higher prevalence among boys (17%) than girls (7.1%). Despite this, cigarette consumption per capita declined by 28% from 2010 to 2022, dropping from 100 to 72.4 packs annually [3].

As part of the Global Burden of Disease Study (GBD) 2020, a meta-analysis re-estimated the dose–response relationship between smoking and 36 health outcomes. These included 16 types of cancer, 5 cardiovascular diseases, and 15 other conditions such as chronic respiratory diseases, metabolic disorders, neurodegenerative diseases, musculoskeletal conditions, and Rheumatoid Arthritis [4].

Smoking is a well-established risk factor for autoimmune diseases, notably Rheumatoid Arthritis (RA). It has also been investigated in conditions such as Ankylosing Spondylitis (AS) and Systemic Lupus Erythematosus (SLE) with recent studies reinforcing its role in disease onset, particularly in ACPA-positive RA. For example, smoking interacts with genetic predispositions such as the HLA-DRB1 gene. Individuals carrying the shared epitope alleles of HLA-DRB1 who smoke have a significantly higher risk of developing RA [5]. In RA, smokers typically experience higher disease activity, more disability, and greater challenges in disease management compared to non-smokers. Furthermore, smoking is associated

with a reduced response to disease-modifying antirheumatic drugs (DMARDs), often resulting in increased use of combination therapies or biologic agents to achieve disease control [6].

Recent data show that cigarette smoking raises the risk of developing seropositive RA. A meta-analysis reported a two-fold increased risk among individuals who smoked for over 20 years and a nearly four-fold risk in current male smokers (OR = 3.91) compared to male non-smokers [7,8]. Smoking has also been associated with the presence of anti-citrullinated protein antibodies (ACPA), suggesting it may promote autoantibody production. Additionally, it is linked to extra-articular manifestations of RA, including pulmonary involvement [9,10].

On a cellular level, fibroblast-like synoviocytes (FLS) in the synovial membrane normally produce lubricin to maintain joint function. In RA, however, these cells shift toward a proinflammatory phenotype, secreting cytokines such as IL-1, IL-6, and IL-8, as well as matrix-degrading enzymes, contributing to joint destruction. Exposure to cigarette smoke condensate (CSC) further amplifies this inflammatory response, particularly increasing IL-1 and TNF-α production - both central to RA pathogenesis [11,12,13]. Smoking also diminishes the effectiveness of immunosuppressive and biologic therapies by modulating immune responses, while cessation may enhance treatment efficacy and improve long-term outcomes. In Rheumatoid arthritis (RA), cigarette smoking influences disease through complex genetic, environmental, immune, and epigenetic interactions, particularly affecting seropositive RA subtypes and varying by ethnicity [12]. Sirtuins (SIRTs), particularly SIRT1 and SIRT6, play a regulatory role in RA-related inflammation. SIRT1 promotes chronic inflammation, whereas SIRT6 helps limit matrix degradation [14,15]. Heat shock proteins (HSPs), which are upregulated in smokers with RA, may act as a link between genetic and environmental factors, contributing to inflammation and tissue damage via Toll-like receptor pathways in fibroblast-like synoviocytes (FLS) [16].

According to the National Osteoporosis Association of Georgia, approximately 38% of all registered fractures in the country are due to Osteoporosis, including 20% vertebral and 18% non-vertebral fractures, while only 25% of hip fracture patients are hospitalized [17]. Osteoporosis is a common, debilitating condition associated with reduced bone strength and significant healthcare costs. Smoking contributes to bone loss by decreasing bone mineral density (BMD) and increasing fracture risk. Mechanisms include altered calcium metabolism, impaired sex hormone and adrenal hormone regulation, and disruption of the RANK–RANKL–OPG signaling pathway. Smoking also directly affects bone cell function. Encouragingly, many of these effects appear to be reversible with smoking cessation [18].

Cigarette smoking is a recognized risk factor for Systemic Lupus Erythematosus (SLE) and negatively affects both disease progression and treatment response [19]. While smoking does not significantly alter the presence of key autoantibodies such as anti-dsDNA, anti-Sm, and anti-SSA, it has been shown to reduce the efficacy of therapies. Notably, smoking diminishes the therapeutic response to hydroxychloroquine in Cutaneous Lupus and belimumab in SLE. These findings highlight the importance of smoking cessation as a cost-effective and essential strategy in the comprehensive management of SLE patients [20].

Smoking contributes to the onset and worsens the progression of Ankylosing Spondylitis (AS) also. Smokers with AS show greater spinal stiffness, higher inflammation markers such as C-reactive protein (CRP), and faster structural damage including vertebral fusion compared to non-smokers [21,22,23]. Smoking also reduces the effectiveness of TNF inhibitors, likely due to immune system alterations caused by smoking [24]. The prevalence of smoking in AS patients is generally higher than in the general population.

Though mechanisms are not fully understood, smoking is believed to increase oxidative stress and alter immune responses, intensifying inflammation and negatively impacting bone metabolism, which raises fracture risk in AS patients [25].

Smoking is associated with the exacerbation of Rheumatic diseases through mechanisms including increased oxidative stress and elevated pro-inflammatory cytokines, such as TNF and IL-6. Additionally, cigarette smoke may alter the gut microbiome, contributing to dysbiosis and intestinal inflammation that can influence autoimmune responses. Smoking cessation has been shown to partially mitigate these effects by reducing oxidative damage and restoring immune balance [26,27].

Smoking adversely affects Psoriasis by increasing disease severity, including higher PASI scores, greater nail involvement, and cardiovascular comorbidities. Tobacco use is a major factor reducing treatment efficacy; psoriasis patients who do not smoke have significantly higher rates of treatment success (68.0%) compared to smokers (21.3%) [28]. Moreover, former smokers show less improvement in PASI scores after biologic therapy than non-smokers (OR = 0.80) [29].

The harmful effects of smoking are driven by free radicals and nicotine-induced overproduction of pro-inflammatory cytokines, which exacerbate Psoriatic lesions. Smoking impacts Psoriasis occurrence, severity, comorbidities, and treatment outcomes [30].

Aim of study. Aim of study was to assess the impact of tobacco consumption on the prevalence and morbidity of Rheumatic diseases, providing valuable insights into the role of smoking in the progression of these conditions.

Materials and methods. The study was conducted at the Solomed Clinic in Batumi, in the Adjara Region, Georgia, in 2025. We interviewed 131 patients (82 women and 49 men) who have Rheumatic diseases, using a questionnaire. This questionnaire explored the prevalence of tobacco use among patients and its potential impact on the progression of Rheumatic disease. The study was conducted anonymously.

Results. Among the 131 patients included in the study, the distribution according to smoking status was as follows: active smokers – 42% (n=55), passive smokers – 31.3% (n=41), and non-smokers – 26.7% (n=35). The highest proportion of active smokers was observed in the 55–65-year age group. The majority of active smokers were men, whereas women predominated among passive smokers. The distribution of Rheumatic diseases according to smoking status revealed that Ankylosing Spondylitis was the most frequent diagnosis (n=41), followed by Psoriatic Arthritis (n=31), Rheumatoid Arthritis (n=26), Metabolic Arthropathy (n=14), Osteoporosis (n=8), and other joint diseases (n=11) (Table 1.).

Table 1. Number of Tobacco Users by Disease

Diseases		Active smoker	Passive smoker	Non-smoker
Ankylosing spondylitis	**Total**	**23**	**7**	**11**
	Female	3	6	9
	Male	20	1	2
Psoriatic arthritis	**Total**	**15**	**7**	**9**
	Female	6	5	7
	Male	9	2	2
Rheumatoid arthritis	**Total**	**7**	**11**	**8**
	Female	3	11	8
	Male	4	0	0
Metabolic arthropathy	**Total**	**6**	**5**	**3**
	Female	3	5	3
	Male	3	0	0

Osteoporosis	**Total**	**0**	**6**	**2**
	Female	0	6	2
	Male	0	0	0
Other joint diseases	**Total**	**4**	**6**	**1**
	Female	1	4	1
	Male	3	2	0

Regarding comorbidities, Gastrointestinal disorders were the most common among smokers (35%), followed by Thyroid diseases (24.7%), Arterial Hypertension (16.5%), Diabetes Mellitus (11.3%), while 12.4% reported no comorbidities. The prevalence of comorbid conditions was highest among active smokers (64%), followed by passive smokers (26%), and non-smokers (10%) (Table 2.).

Table 2. Prevalence of Comorbidities among Smoking Patients

Comorbidities	Percentage, %
1. Gastrointestinal disorders	35%
2. Thyroid diseases	24.7%
3. Arterial hypertension	16.5%
4. No comorbidities reported	12.4%
5. Diabetes mellitus	11.3%

In terms of lifestyle characteristics, 58.78% (n=77) of respondents reported being physically active, while 41.22% (n=54) were not. Notably, 87.1% (n=114) of respondents indicated that after quitting or attempting to quit smoking, they observed an improvement in their disease symptoms.

When asked whether smoking had influenced the severity of their Rheumatic condition, 60.4% of participants responded affirmatively, 27.1% were uncertain, and 12.5% reported no effect. Among respondents who believed that smoking had worsened their condition 38.5% associated smoking with increased pain and inflammation, 30.2% believed it led to reduced joint mobility, 15.6% felt it caused a decrease in medication effectiveness, The remaining 15.7% either linked smoking to more than one symptom at the same time, or did not associate it with any of the specific symptoms listed above. This analysis gives a full picture of how smoking was thought to affect their disease.

The assessment of disease severity and clinical course according to smoking status showed that rheumatic diseases were most severe among active smokers, whereas the mildest course was observed in non-smokers. The percentage values presented in the table were calculated based on data collected through a custom-designed questionnaire, patient medical history (anamnesis), laboratory findings, and treatment response. Using multiple sources of information helped us better understand how severe the disease was in people with different levels of smoking exposure (Table 3.).

Table 3. Severity of Rheumatic Diseases according to Smoking Status

	Mild	Moderate	Severe
Active smoker	15%	27%	58%
Passive smoker	29%	33%	38%
Non-smoker	41%	35%	24%

Conclusion. This study demonstrates that rheumatic diseases typically require ongoing or long-term medical management, reflecting their chronic and progressive nature. Tobacco use was found to be more prevalent among older adults, with the highest number of both active and passive smokers identified within the 55–65-year age group. Active smoking was more common among men, while women

predominated among passive smokers, suggesting possible environmental and behavioral influences. The findings revealed that smoking cessation may have a beneficial effect on the course of rheumatic diseases. The majority of respondents who quit or attempted to quit smoking reported noticeable improvement in their disease symptoms, highlighting the potential for smoking cessation to alleviate disease activity and enhance treatment outcomes. Disease severity was found to be greatest among smokers and mildest among non-smokers, confirming the negative role of tobacco exposure in worsening disease progression. Furthermore, our results showed that every second patient was an active smoker, every third was a passive smoker, and only one in four was a non-smoker. Our findings highlight the urgent need for the implementation of preventive and educational strategies by rheumatic disease awareness societies to minimize tobacco exposure among individuals with rheumatic diseases.

Implications for Practice. Given the clear association between tobacco use and increased disease severity, healthcare providers should incorporate smoking cessation counseling as a standard component of Rheumatologic care. Early intervention and continuous patient education are essential to mitigate the harmful effects of smoking on disease progression and therapeutic response.

Developing multidisciplinary programs that combine medical treatment with lifestyle modification — including physical activity promotion and tobacco cessation — may significantly improve clinical outcomes and patients' quality of life.

In addition, integrating public health campaigns targeting older adults and women exposed to passive smoking could further enhance awareness and prevention efforts. Future research should focus on identifying the biological mechanisms through which smoking cessation influences inflammation and disease activity, to optimize individualized treatment strategies for patients with Rheumatic diseases.

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IMPACT OF TOBACCO SMOKING ON RUN OF RHEUMATIC DISEASES

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SUMMARY

Introduction: The global prevalence of Rheumatic diseases is steadily increasing, presenting a significant public health concern. Among various environmental risk factors, tobacco use is one of the most strongly associated with the development and progression of autoimmune diseases. Smoking-related illnesses account for over 8 million deaths annually, with more than 7 million due to direct tobacco use and the remainder caused by exposure to second-hand smoke. In patients with Rheumatic diseases Smoking has been linked not only to the onset of diseases such as Rheumatoid arthritis and Systemic Lupus Erythematosus but also to increased disease severity, higher inflammatory markers, and reduced treatment efficacy. For instance, a population-based study found that current smokers with rheumatoid arthritis exhibited higher disease activity and lower health-related quality of life compared to non-smokers, while early smoking cessation was associated with improved outcomes. This contributes to a greater health burden through increased morbidity, diminished quality of life, and higher healthcare costs. Addressing tobacco use is therefore essential in the prevention and management of Rheumatic diseases.

Aim of study: The study aimed to assess the impact of tobacco consumption on the prevalence and run of Rheumatic diseases, providing valuable insights into the role of smoking in the progression of these conditions.

Materials and methods: Research was conducted in 2025 at "Solomed" Clinic in Batumi, Georgia, involving 131 patients with different Rheumatic diseases (82 women and 49 men). An anonymous survey was used to assess tobacco use and its impact on disease progression.

Results: Among the 131 patients, 42% (n=55) were active smokers, 31.3% (n=41) passive smokers, and 26.7% (n=35) non-smokers. The highest prevalence of smoking was observed in the 55-65 age group. Rheumatic disease distribution by smoking status included Ankylosing Spondylitis (n=41), Psoriatic Arthritis (n=31), Rheumatoid Arthritis (n=26), Metabolic Arthropathies (n=14), Osteoporosis (n=8), and other joint diseases (n=11). Active smokers were predominantly male. A majority of patients 58.78% (n=77) identified as physically active. Most patients (87.8%, n=115) were receiving treatment for their rheumatic conditions, with 64.89% (n=85) on biological therapy. Notably, 87.1% (n=114) of respondents observed symptom improvement after quitting or attempting to quit smoking. Disease severity was highest among active smokers and lowest among non-smokers. When all groups were combined, 28.3% of patients

had mild disease, 31.7% had moderate disease, and 40.0% had severe disease, indicating a clear trend of increasing severity with greater tobacco exposure. These percentages were obtained from data collected through a custom-designed questionnaire, patient anamnesis, laboratory findings, and treatment response, allowing a comprehensive assessment of disease severity across different levels of smoking exposure.

Conclusion: Our study demonstrates that Rheumatic diseases generally require ongoing or long-term medical management, Tobacco use is more prevalent among older adults. The highest number of passive smokers also in this age group. The findings suggest a positive impact of smoking cessation on the run of Rheumatic diseases, highlighting the importance of strengthening preventive measures for this patient population. Disease severity was greatest among smokers and mildest among non-smokers. By our findings, every second individual is classified as an active smoker, every third individual as a passive smoker. Our results highlight the urgent need to raise awareness among patients about the harmful effects of tobacco use and the benefits of smoking cessation.

Keywords: Rheumatic Diseases, Smoking, Autoimmune Diseases, Severity, Progression