BR 2025; 7 (1) : e571
DOI: 10.53238/br_202510_571

THE POTENTIAL ROLE OF NIACIN (VITAMIN B3) IN RHEUMATIC DISEASES

J.F. DE CARVALHO

• • •

Núcleo de Pesquisa em Doenças Crônicas não Transmissíveis (NUPEN), School of Nutrition from the Federal University of Bahia, Salvador, Bahia, Brazil

Corresponding Author
Jozélio Freire de Carvalho, MD; Email: jotafc@gmal.com

ABSTRACT – Patients with autoimmune rheumatic diseases have an increased cardiovascular risk driven by chronic systemic inflammation and frequent dyslipidemia. Niacin (nicotinic acid or vitamin B3) is a classic lipid-lowering agent with pleiotropic effects, including anti-inflammatory properties mediated by the G protein-coupled receptor GPR109A. Despite consistent biological rationale, direct clinical evidence on the use of niacin in rheumatic diseases remains scarce. This narrative review synthesizes the available data covering biological mechanisms, observational studies, clinical data, and current gaps in literature. Few studies were found, including observational analyses associating higher dietary niacin intake with lower prevalence of rheumatoid arthritis and better function in osteoarthritis, as well as a small clinical study demonstrating the benefit of topical nicotinamide in cutaneous discoid lupus lesions. To date, no completed clinical trials have evaluated the use of oral niacin for inflammation modulation or cardiovascular prevention in patients with rheumatoid arthritis, systemic lupus erythematosus, or other autoimmune diseases. Future clinical trials are needed to clarify whether niacin could play a relevant role in rheumatology practice.

KEYWORDS: Niacin, Nicotinic acid, Rheumatic diseases, Rheumatoid arthritis, Systemic lupus erythematosus, Inflammation, Dyslipidemia.

INTRODUCTION

Autoimmune rheumatic diseases, such as rheumatoid arthritis and systemic lupus erythematosus, are characterized by chronic systemic inflammation, dyslipidemia, and an increased cardiovascular risk, which are significant contributors to the morbidity and mortality of these patients[1-3]. Atherosclerotic and occlusive diseases are more aggressive, occurring early, and developing rapidly in these populations due to the synergy of traditional risk factors and immune-mediated inflammatory mechanisms.

The modulation of lipid metabolism is relevant not only for preventing cardiovascular events but also as a possible anti-inflammatory strategy in autoimmune diseases. Niacin, also known as vitamin B3 or nicotinic acid, is fundamentally important to energy metabolism and a lipid-lowering agent, acting on atherogenic lipoproteins, such as low-density lipoprotein cholesterol and lipoprotein. It raises high-density lipoproteins and reduces the production and release of these pro-inflammatory cytokines[4-6].

Its anti-inflammatory activity is regulated by G protein-coupled receptor GPR109A on macrophages, dendritic cells, and adipose cells. In addition to this action against inflammation, studies show that niacin also exerts pleiotropic effects. Despite this promising biological rationality, clinical evidence is still rare on this topic. Large cardiovascular studies, like HPS2-THRIVE and AIM-HIGH, have shown the non-superior efficacy of niacin, added to statin regimens in reducing cardiovascular events, and many adverse effects, such as flushing, liver toxicity, insulin resistance worsening and increased uric acid. Al-

though this greatly discouraged cardiology in using this medication, it does not nullify the possible specific action against inflammation and lipid metabolism in rheumatic patients[7-9].

Thus, it is essential to review the existing data on niacin in rheumatic diseases, highlighting its therapeutic potential, current clinical evidence, and the gaps in knowledge that should guide future research.

METHODS

This narrative literature review was conducted to identify studies involving the use of niacin (nicotinic acid or vitamin B3) in autoimmune rheumatic diseases and osteoarthritis. The databases searched included PubMed/MEDLINE, Embase, Web of Science, Cochrane Library, SciELO, and LILACS, covering publications from 1965 to September 2025. Search strategies combined terms related to the intervention and target diseases, using combinations such as: "niacin" OR "nicotinic acid" OR "vitamin B3" AND "rheumatoid arthritis" OR "systemic lupus erythematosus" OR "spondyloarthritis" OR "psoriatic arthritis" OR "vasculitis" OR "Sjögren syndrome" OR "gout" OR "osteoarthritis".

Clinical studies, observational studies, narrative and systematic reviews, and reports on topical use for cutaneous lupus manifestations were included. Experimental studies in animal models were used only to contextualize biological mechanisms. Articles without original data or those not directly addressing rheumatic diseases were excluded. The selection process involved title and abstract screening, followed by full-text assessment. Data were manually extracted and presented descriptively, without meta-analysis, respecting the scope of a narrative review.

RESULTS

The search revealed a very limited number of publications on the use of niacin in rheumatic diseases. There were no included finished clinical trials that tested oral niacin supplementation in patients with RA/SLE or other autoimmune diseases.

An inverse association between dietary niacin intake and the prevalence of rheumatoid arthritis in women, but not in men, was found from a cross-sectional observational study using National Health and Nutrition Examination Survey (NHANES) data. The prevalence of RA decreased significantly in women with a higher dietary niacin intake, independent of age, body mass index, and smoking. This finding is exploratory and, although suggestive, does not imply causation[10].

Longitudinal observational study showed an inverse correlation of dietary niacin intake with pain intensity and physical function (WOMAC score) in OA. Nevertheless, there is no clinical trial that has explored the direct impact of niacin supplementation on clinical events in this cohort[11].

In patients with discoid lupus, a small open-label clinical trial was performed using topical nicotinamide (amidated form of vitamin B3). Topical formulations of 2% and 4% have shown a clinical response in skin lesions when they were used as adjunct to standard therapy. There was site-specific effect without any systemic impact or on general disease activity[12].

These results show that the present clinical literature is characterized by observational research and preliminary topical data only, without providing robust evidence for oral niacin supplementation in rheumatic diseases (Table 1).

DISCUSSION

The results of this review reveal that there is lack of coherent clinical evidence for administration of niacin in autoimmune rheumatic diseases. However, the biological Rationale for potential benefits based on this hypothesis is supported, predominantly mediated by GPR109A activation and influence of inflammation; yet clinical studies to substantiate this suggestion have not been conducted[7-9].

The association between inflammation, dyslipidemia and CAD risk in RA is well known[1-3]. Niacin is special in that it significantly raises HDL-C, theoretically offering a potential advantage to patients with the reported "lipid paradox" associated in RA[4,6]. Nevertheless, evidence from large CV studies, such as HPS2-THRIVE and AIM-HIGH provided us with evidence that niacin does not add overall CV benefits in patients on statins and causes major AEs[10,11]. Therefore, any future studies in rheumatological patients will need to be well thought out with close monitoring of safety.

Table 1. Identified studies on niacin and rheumatic diseases.

Author, year [Ref]	Study type	Disease	N (sex)	Intervention/ exposure	Main outcomes	Adverse events
Hong & Jiang, 2024[10]	Cross-sectional observational study	Rheumatoid arthritis	4,983 (female)	Dietary niacin intake (NHANES)	Higher intake associated with lower RA prevalence after adjustments	Not applicable
Zheng et al[11], 2024	Longitudinal observational study	Knee osteoarthritis	762 (mixed)	Dietary niacin intake	Higher intake associated with lower pain and better physical function (WOMAC)	Not applicable
Nouh et al[12], 2023	Small open-label clinical study	Discoid lupus	24 (mixed)	Topical nicotinamide 2–4%	Clinical improvement of skin lesions as adjuvant therapy	Mild local irritation

In addition, in SLE patients' inflammatory dyslipidemia leads to increased atherosclerosis that represents one of the major causes of mortality[13]. Currently there is no known data concerning the systemic use of Niacin in SLE patients. The only available clinical evidence is of the use of topical nicotinamide in cutaneous lesions, which does not have systemic effect other than in the skin[12].

There is interesting observational evidence that dietary niacin intake may be associated with potential protective effects in RA and OA[10,11]. However, one should interpret these results with caution given the limitations of the method and any causal pathway demonstrated.

Limitations

Since data are limited, more prospective study in this area is warranted for defining the role of niacin in rheumatic diseases. Randomized clinical trials in which not only clinical outcomes (e.g., disease activity, cardiovascular events) but also inflammatory and lipid biomarkers are studied will be needed further to investigate mechanisms of action as well as subgroups of patients who might benefit.

CONCLUSIONS

In summary, although niacin has interesting biologic mechanisms and preliminary studies demonstrate potential benefits, current clinical evidence does not favor its routine use in rheumatic diseases. Without strong new evidence, this should be reserved for use in research settings.

Conflict of Interest:
The author declares no conflict of interest related to this study.

Acknowledgments:
The author would like to thank all collaborators involved in this study for their valuable contributions.

ORCID ID:
Jozélio Freire de Carvalho: 0000-0002-7957-0844.

Funding:
This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

Data Availability Statement:
The data supporting the findings of this study are available from the corresponding author upon reasonable request.

REFERENCES

1. Robinson G, Pineda-Torra I, Ciurtin C, Jury EC. Lipid metabolism in autoimmune rheumatic disease: implications for modern and conventional therapies. J Clin Invest 2022; 132: e148552.
2. Dijkshoorn B, van der Giessen L, Nurmohamed MT. Cardiovascular Disease Risk in Rheumatoid Arthritis Anno 2022. J Clin Med 2022; 11: 2704.
3. Drosos AA, Venetsanopoulou AA, Pelechas E, Voulgari PV. Exploring cardiovascular risk factors and atherosclerosis in rheumatoid arthritis. Eur J Intern Med 2024; 128: 1-9.
4. Zivkovic S, Maric G, Cvetinovic N, Lepojevic-Stefanovic D, Bozic Cvijan B. Anti-Inflammatory Effects of Lipid-Lowering Drugs and Supplements-A Narrative Review. Nutrients 2023; 15: 1517.
5. Ganji SH, Kamanna VS, Kashyap ML. Niacin and cholesterol: role in cardiovascular disease. J Nutr Biochem 2003; 14: 298-305.
6. Kamanna VS, Kashyap ML. Mechanism of action of niacin. Am J Cardiol 2008; 101: 20B-26B.
7. Feingold KR, Moser A, Shigenaga JK, Grunfeld C. Inflammation stimulates niacin receptor (GPR109A/HCA2) expression in adipose tissue and macrophages. J Lipid Res 2014; 55: 2501-2508.
8. Graff EC, Fang H, Wanders D, Judd RL. Anti-inflammatory effects of the hydroxycarboxylic acid receptor 2. Metabolism 2016; 65: 102-113.
9. Tuteja S, Rader DJ. Activation of HCAR2 by niacin: benefits beyond lipid lowering. Curr Opin Lipidol 2019; 30: 314-320.
10. Hong X, Jiang F. Association Between Dietary Niacin Intake and Rheumatoid Arthritis in American Women: A Study Based on National Health and Nutrition Examination Survey Database. Int J Womens Health 2024; 16: 2209-2219.
11. Zheng Z, Luo H, Xue Q. Association between niacin intake and knee osteoarthritis pain and function: a longitudinal cohort study. Clin Rheumatol 2024; 43: 753-764.
12. Nouh AH, Elshahid AR, Kadah AS, Zeyada YA. Topical niacinamide (Nicotinamide) treatment for discoid lupus erythematosus (DLE): A prospective pilot study. J Cosmet Dermatol 2023; 22: 1647-1657.