

# Lifestyle medicine – a new promise for shifting the tide of non-communicable diseases

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## ABSTRACT:

Lifestyle medicine developed as a response to the global burden and consequences of non-communicable diseases (NCDs), which dominate epidemiological trends in mortality, morbidity, and disability worldwide during the last couple of decades. Lifestyle medicine includes six pillars, the use of whole food, plant-predominant dietary pattern, regular physical activity, restorative sleep, stress management, avoidance of risky substances, and positive social connection, as evidence-based and primary therapy modalities aiming for treatment and reversal of chronic diseases. Interest in lifestyle medicine is increasing globally, and it was even further advanced during the COVID-19 pandemic. Additionally, professional interest in lifestyle medicine is fueled by the extended learning opportunities based on the findings of recent studies demonstrating the reversible nature of NCDs, especially for diabetes type 2 and obesity. These results request a thorough contemplation of our current understanding of the “uncurable” nature of diabetes type 2, but also for other chronic non-communicable diseases, and demand a paradigm shift in medical practice and education. This requires education of medical students and doctors, adaptation of reimbursement and health insurance policies, and forming multidisciplinary teams that will be able to deliver lifestyle intervention procedure to all who need it. The future of healthcare and NCDs management is the long-term self-care by patients, assisted by physicians and other professionals, such as nurses, nutritionists, physical therapists or kinesiologists, psychologists, health educators, pharmacists, and social workers, as indicated. The ultimate goal has to be reaching the best possible health in individuals and communities. The time for action is yesterday.

OPEN ACCESS

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This article was submitted to RAD  
CASA - Medical Sciences  
as the original article

**Conflict of Interest Statement:**  
The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

**Received:** 15 May 2023  
**Accepted:** 01 June 2023  
**Published:** 26 June 2023

**Citation:**  
Kolčić I. Lifestyle medicine – a new promise for shifting the tide of non-communicable diseases 556=62-63 (2023): 66-70  
DOI: 10.21857/m16wjcnz59

**KEYWORDS:** lifestyle medicine, non-communicable diseases, disease remission, nutrition, diabetes mellitus type 2

## SAŽETAK:

LIFESTYLE MEDICINA – NOVO OBEĆANJE ZA PROMJENU PLIME NEZARAZNIH BOLESTI  
Medicina životnog stila razvila se kao odgovor na globalno opterećenje i posljedice kroničnih nezaraznih bolesti, koje dominiraju epidemiološkim trendovima u mortalitetu, morbiditetu i onesposobljenosti diljem svijeta tijekom posljednjih nekoliko desetljeća. Medicina životnog stila uključuje šest stupova; korištenje cjelovite hrane, tj. obrazac prehrane u kojem prevladavaju namirnice biljnog podrijetla, redovitu tjelesnu aktivnost, obnavljajući san, upravljanje stresom, izbjegavanje rizičnih tvari i pozitivnu društvenu povezanost, kao primarne terapijske modalitete utemeljene na dokazima, s konačnim ciljem liječenja i remisije kronične bolesti. Interes za medicinu životnog stila je u porastu na

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globalnoj razini, a još je više uznapredovao tijekom COVID-19 pandemije. Uz to, interes profesionalaca je potaknut i proširenim mogućnostima obrazovanja temeljem rezultata nedavnih studija, koje pokazuju reverzibilnu prirodu kroničnih nezaraznih bolesti, posebice za dijabetes tipa 2 i pretilost. Ovi rezultati zahtijevaju temeljito razmatranje našeg trenutnog razumijevanja "neizlječive" prirode dijabetesa tipa 2, ali i drugih kroničnih nezaraznih bolesti te zahtijevaju promjenu paradigme u medicinskoj praksi i obrazovanju. Za to je potrebna edukacija studenata medicine i liječnika, prilagodba zdravstvene politike i zdravstvenog osiguranja te formiranje multidisciplinarnih timova, koji će biti osposobljeni provesti proceduru promjene životnog stila za sve kojima je to potrebno. Budućnost zdravstvene skrbi i upravljanja kroničnim bolestima je dugoročno samozbrinjavanje pacijenata, uz pomoć liječnika i drugih stručnjaka, kao što su medicinske sestre, nutricionisti, fizikalni terapeuti ili kineziolozi, psiholozi, zdravstveni edukatori, farmaceuti i socijalni radnici, prema indikacijama. Krajnji cilj mora biti postizanje najboljeg mogućeg zdravlja pojedinaca i zajednice. Vrijeme za akciju je jučer.

**KLJUČNE RIJEČI:** medicina životnog stila, kronične nezarazne bolesti, remisija bolesti, prehrana, dijabetes tipa 2

## INTRODUCTION

During the past couple of decades, non-communicable diseases (NCDs) have dominated epidemiological trends and statistics in mortality, morbidity, and disability worldwide. For example, ischemic heart disease and stroke have been the second and third global leading cause of disability-adjusted life-years (DALYs) in 2019, estimated to have risen overall by 50.4% and 32.4% from 1990 to 2019, respectively (1). But, the most alarming increase was recorded for diabetes, with a global rise of 147.9% during the last three decades (1). These and other non-communicable diseases are driven mostly by lifestyle-related risk factors. Daily habits and lifestyle patterns, including smoking, unhealthy dietary practices, and lack of physical activity all contribute to these statistics. For instance, in 2019, the leading risk factor for death globally was high systolic blood pressure (accounting for estimated 19.2% or 10.8 million deaths), followed by all types of tobacco exposure, which accounted for 8.71 million deaths or 15.4% (2). Additionally, exposures and risk factors that are particularly worrisome on the global scale due to their continuous and further increase (estimated to be increasing >0.5% per year) include alcohol use, drug use, high fasting plasma glucose, high systolic blood pressure, and high BMI, while the exposure to metabolic risks increased by 1.37% per year from 1990 to 2019 (2).

The extreme results on cardiometabolic health were obtained from the National Health and Nutrition Examination Survey 2009-2016 in the USA, where only 12.2% of adults were found to be metabolically healthy (3). Not very surprisingly, optimal metabolic health, defined as having optimal levels of waist circumference, glucose, blood pressure, HDL cholesterol, and not taking any related medication, was more commonly found in women, younger adults, more educated people, as well in

those who were never smoking, were practicing vigorous physical activity, and had low BMI (3). Contrary to the common belief that lean people are usually healthy, this study found that only less than one-third of normal-weight adults were metabolically healthy in the USA (3).

One of the biggest and far-reaching rupture of the modern era worldwide, COVID-19 pandemic, found this poor overall population health as a fruitful ground for sowing death and terror. For instance, 63.5% of COVID-19 hospitalizations until November 18, 2020 in US adults were attributable to four cardiometabolic conditions; 30.2% were attributable to obesity, 26.2% to hypertension, 20.5% to diabetes, and 11.7% to heart failure (4). As the editorial in *The Lancet Diabetes & Endocrinology* concluded, "COVID-19 has sent the world a wake-up call about its inaction on metabolic diseases; in the post-COVID-19 era, metabolic health must be a priority, with obesity taking center stage as the number one non-communicable public health concern of our time" (5).

Aforementioned and so many more similar epidemiologic data, alongside the monetary costs and immeasurable loss in productivity and well-being associated with the current health picture of the global population, point to the deep crisis in health we have been facing for some time now. We need urgent effective and robust solutions for tackling non-communicable diseases and preventing further degradation of human potential. One such promising solution is Lifestyle Medicine.

## DEFINITION AND DEVELOPMENT OF LIFESTYLE MEDICINE

Given the complex nature of chronic diseases, their strong causation in daily habits, choices and lifestyle, and their enormous

global burden, a new way of thinking started to emerge. The term “lifestyle medicine” first appeared more than 30 years ago, coined by Ernst Wynder, American epidemiologist, who mentioned it for the first time at a congress held in Brussels in 1989 (6). James Rippe edited the first book describing this emerging field of medicine in 1999, and the first professional society for physicians was founded in the USA, called the American College of Lifestyle Medicine. Today this is a regulated new medical field, with its own global certification program that was introduced in 2016 in order to standardize the field (6). Lifestyle medicine is even on its way of becoming a new specialty (7). Interest in lifestyle medicine is global and increasing, and it was especially advanced during disruptions from the COVID-19 pandemic, but also due to the expanded educational opportunities in the field, and a changing healthcare landscape (8), which demands an adjusted approach to NCDs.

The current definition of lifestyle medicine states that it is “a medical specialty that uses therapeutic lifestyle interventions as a primary modality to treat chronic conditions including, but not limited to, cardiovascular diseases, type 2 diabetes, and obesity. Lifestyle medicine certified clinicians are trained to apply evidence-based, whole-person, prescriptive lifestyle change to treat and, when used intensively, often reverse such conditions. Applying the six pillars of lifestyle medicine - a whole-food, plant-predominant eating pattern, physical activity, restorative sleep, stress management, avoidance of risky substances and positive social connections - also provides effective prevention for these conditions” (9).

Such holistic health care model is not at all new. For example, Hippocrates highlighted the importance of understanding the patient’s health, emphasized environmental causes and natural treatments of diseases, especially nutrition and lifestyle, and the need for the “harmony between the individual and the social and natural environment” (10). In many aspects, lifestyle medicine is the “resurrection” of the teaching of Hippocrates. It places the whole patient in the center of care and it emphasizes the broader circumstances the person lives in, as depicted in inclusion of as many as the six pillars of lifestyle medicine. These pillars incorporate nutrition, physical activity, sleep, stress, addictions and risky behaviors, as well as commonly underestimated, but crucially important, social aspects and personal social interactions. Given the broad scope, the need for a multidisciplinary team is rendered in lifestyle medicine practice, including professionals of different backgrounds. These team members are invited in order to provide effective medical care within the interdisciplinary team of broader health care professionals. The core team usually consists of the physician, nurse, nutritionist, physical therapist or kinesiologist, psychologist, and if needed a health educator, a social worker and a pharmacist (6). Additionally, it is important to stress out that lifestyle medicine is not at all in opposition to indicated pharmacological and surgical treatment and procedures. Lifestyle medicine is not an alternative medicine direction, and

it embraces all the technological and scientific advances modern medicine has to offer for the betterment of the patient. However, the main difference between lifestyle medicine and conventional medicine is the primary focus towards modification of lifestyle pattern and daily habits (as they are the root cause of NCDs), instead of the medicaments used as the first line of intervention. Liana Lianov and Mark Johnson proposed the initial lifestyle medicine competencies for primary care physicians in 2010, in the domains of leadership (2 competencies), knowledge (2 competencies), assessment (3 competencies), management skills (4 competencies), and office and community support (4 competencies) (11). These competencies have been updated recently, placing focus on enduring clinical knowledge and skills, but also including the knowledge of the impact of our lifestyles on planetary health, given its relevance and repercussions to our health and survival (12).

#### THE EVIDENCE ON ASSOCIATION BETWEEN LIFESTYLE HABITS AND HEALTH OUTCOMES

The abundance of evidence behind what Hippocrates recommended and taught regarding protection of health and disease prevention have emerged in the recent years. Many population-based studies have demonstrated and quantified the effect of healthy lifestyle on positive health outcomes. One such study from Germany, including 23,153 subjects during a mean follow-up of 7.8 years showed that four simple healthy lifestyle habits can result in 78% lower risk of developing a chronic disease (13). Namely, subjects who never smoked, and were having a BMI <30 kg/m<sup>2</sup>, performing physical activity for ≥3.5 h per week, and were adhering to healthy dietary principles, had 93% reduced risk for developing diabetes, 81% reduced risk for developing myocardial infarction, and 36% reduced risk for developing cancer, compared to subjects who had none of the investigated healthy habits (13).

Another large population-based study from the USA (N=123,219) examined life expectancy of people at the age of 50 years, depending on the number of healthy, low-risk lifestyle factors present (14). The main findings of this study are striking. Women who had all five investigated healthy habits (never smoking, having ≥3.5 h/week of moderate to vigorous intensity physical activity, having high diet quality, moderate alcohol intake, and BMI <25 kg/m<sup>2</sup>) could look ahead to a life expectancy of 43.1 years at age of 50 years, compared to 29.0 years of life expectancy for women who adopted none of these low-risk lifestyle factors, amounting to 14 years of extra life (14). The numbers for men were similar, with the difference of extra 12.2 years of life expectancy that could be attributed to a healthy lifestyle. This study also showed that adults with all five healthy habits had 74% reduced risk for all-cause mortality, 65% reduced risk for cancer mortality, and 82% for cardiovascular disease mortality, compared to adults with zero healthy habits during 34 years of follow-up (14).

The study that jointly analyzed data from 12 European cohorts with the mean follow-up of 12.5 years added more compelling evidence towards favorable effects of healthy lifestyle, namely towards the number of disease-free life-years in adults who adopted a healthy lifestyle, estimated according to their smoking status, BMI, physical activity, and alcohol consumption (15). This study found that men could expect 9.9 additional healthy years without chronic diseases (type 2 diabetes, coronary heart disease, stroke, cancer, asthma, and chronic obstructive pulmonary disease), while women could expect 9.4 additional healthy years associated with healthy lifestyle (15).

These studies and many more that can be found in the literature have shown the potential of healthy lifestyle for promotion and protection of good health. However, recent studies also point towards extraordinary effects of healthy lifestyle and lifestyle modification on NCDs treatment and even disease remission (reversal). One such seminal study showed that a dietary intervention can be and should be an important clinical option to consider in the treatment of moderate to severe depression (16). In this randomized controlled trial, entitled “Supporting the Modification of lifestyle In Lowered Emotional States” (SMILES), during the period of only 12 weeks, the intervention group received an improved diet using a modified Mediterranean diet model, which was hypothesized to be superior to a social support (befriending) applied in the control group, with the primary outcome of reducing the severity of depressive symptomatology. The results of this study showed that remission of depression was achieved in 32.3% of subjects from the intervention group and in 8.0% of subjects from the control group, which yielded a statistically significant result for the number needed to treat (NNT) of 4.1 (95% CI 2.3–27.8) (16). This is the first study of its kind to prove, in a rigorous experimental setting, the immense positive potential of healthy nutrition on mental health, without the risk of serious side-effects associated with antidepressant medications. Another groundbreaking and mindset shifting study was focused on the possibility of remission of diabetes type 2 using an intensive lifestyle intervention in a primary care-led weight-management program (17). DiRECT study is a randomized controlled trial, which included middle aged subjects (20–65 years) diagnosed with type 2 diabetes less than 6 years before inclusion in the study, with BMI 27–45 kg/m<sup>2</sup>, and without insulin treatment (17). The coprimary outcomes included weight loss of ≥15 kg, and remission of diabetes (defined as HbA1c less than 6.5%). The lifestyle intervention group procedure started with the withdrawal of antidiabetes and antihypertensive drugs, followed by total diet replacement (825–853 kcal per day formula diet for 12–20 weeks), continued with stepped food reintroduction (2–8 weeks), and finally followed by structured support for weight-loss maintenance. Control group received the best-practice care in accordance with guidelines (17). After two years of follow-up, 35.6% of subjects in the overall intervention group, and only

3.4% of subjects in the control group achieved remission of diabetes (odds ratio 25.82 [95% CI 8.25 to 80.84],  $p < 0.0001$ ), whereas 70% of the subjects who managed to lose ≥15 kg, and to maintain this weight loss, achieved and sustained remission of disease (17). Interestingly and surprisingly, serious adverse events were more frequently recorded in the control group than in the intervention group (17). This study is not an isolated anomaly in the literature. Very similar randomized controlled study, with similar intervention protocol and inclusion criteria, was conducted in the primary care and community settings in Qatar (18). The main results of DIADEM-I study include diabetes remission achieved in 61% of subjects in the intervention group, compared with 12% of subjects in the control group (odds ratio 12.03 [95% CI 5.17 to 28.03],  $p < 0.0001$ ) (18).

These results request a thorough contemplation of our current understanding of the “uncurable” nature of diabetes type 2, but also for other chronic non-communicable diseases, and demand a paradigm shift in medical practice and education.

#### CONCLUSION: NEXT STEPS AND CALL FOR ACTION

The need for reducing the burden of NCDs is great and urgent. Considering the scientific evidence about the beneficial effect of healthy lifestyle for prevention of NCDs, as well as the new evidence demonstrating that NCDs can be successfully treated and even put into remission using lifestyle modifications, we need to focus urgently on the ways and opportunities to apply lifestyle medicine principles into daily clinical practice. With the advancement of technology and telemedicine, growing emphasis on home-based chronic care due to cost reduction and effectiveness, and widening adoption of personalized, patient-empowered treatments, the time is ripe for lifestyle medicine interventions to move into the mainstream of clinical care, and the time for lifestyle medicine is now (8). This requires education of medical students and doctors, adaptation of reimbursement and health insurance policies, and forming multidisciplinary teams that will be able to deliver lifestyle intervention to all who need it. This team will be able to equip the person with NCD diagnosis, as well as the person who is at increased risk for NCDs, with knowledge and tools for long-term self-care and for achieving their best possible health (6). The time for action is yesterday.

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