THE ROLE OF INTEGRATED AYURVEDA AND YOGA IN ADDRESSING THE NON-COMMUNICABLE DISEASE EPIDEMIC IN INDIA: A COMPREHENSIVE ANALYSIS FOCUSING ON PREVENTATIVE AND CURATIVE APPROACHES

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TO WHOM SO EVER IT MAY CONCERN

This is to certify that **Dr. B. Hari Hara Krishna**, currently enrolled in the MBA (Hospital and Health Management), student from IIHMR University, Jaipur has successfully completed his Internship programme on the Project Report entitled– "**The Role of Integrated Ayurveda and Yoga in Addressing the Non-Communicable Disease Epidemic in India: A Comprehensive Analysis Focusing on Preventative and Curative Approaches**" at The National Institute of Health and Family Welfare, New Delhi for the period from 10th March, 2025 to 30th May, 2025 under the guidance of Dr. Vandana Bhattacharya.

His conduct during the Summer Training Programme was good and I wish him a bright career ahead.

(Dr. Manish Chaturvedi)
Additional charge Dean

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CERTIFICATE

This is to certify that dissertation titled "**The Role Of Integrated Ayurveda And Yoga In Addressing The Non Communicable Disease Epidemic In India : A Comprehensive Analysis Focusing On Preventative And Curative Approaches"** is a record of the research work undertaken by **Dr B Hari Hara Krishna** in partial fulfillment of the requirements for the award of the degree of **MBA (Hospital and Health Management)** from the IIHMR University, Jaipur under my guidance and supervision and his approach to the research study has been sincere, scientific, and analytical.

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Declaration

I, Dr. B Hari Hara Krishna, student of MBA in hospital and health management, IIHMR University Jaipur, hereby declare that I have completed my dissertation report entitled "The Role of Integrated Ayurveda and Yoga in Addressing the Non-Communicable Disease Epidemic in India: A Comprehensive Analysis Focusing on Preventative and Curative Approaches" at The National Institute of Health and Family Welfare, New Delhi from 10th March 2025 to 31st May 2025. The information submitted here is entirely true.

I undertook and carried out the entire 'Dissertation Report' under the guidance Dr. Vandana Bhattacharya, Research Officer, NIHFW.

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Abstract

India is currently grappling with a significant public health challenge in the form of NCDs (non-communicable diseases), including conditions such as diabetes, cardiovascular disorders, and chronic respiratory illnesses. These diseases are now responsible for over 60% of all mortalities and impose a significant fiscal strain on both people and the national healthcare system. This dissertation aims to critically examine the potential of integrating Ayurveda and Yoga—two of India's esteemed traditional health systems— become commonplace methods for managing and preventing NCDs. Our primary objectives include analyzing the effectiveness of these integrative approaches, evaluating existing governmental initiatives and policies that support the integration of AYUSH (Ayurveda, Yoga, Naturopathy, Unani, Siddha, and Homoeopathy) in healthcare, while recognizing the ongoing issues that impede their broader integration.

A comprehensive literature review was conducted, focusing on foundational principles of Ayurveda (including Dinacharya and Ritucharya) and Yoga, as well as their roles in addressing theroot causes of chronic diseases through lifestyle modification, personalized interventions and mind body practices..the study systematically reviews evidence from national programs such as NP-NCD-AYUSH integration project, and assesses stakeholder perspectives, including those of healthcare providers and patients. Key methodologies include analysis of policy documents, evaluation of program outcomes and synthesis of qualitative and quantitative research findings

Findings suggest that the integration of Ayurvedic and Yogic practices can yield substantial improvements in the clinical outcomes for individuals living with Non-Communicable Diseases. For instance, benefits observed include reduced blood glucose levels among diabetic patients and an enhanced quality of life for those managing chronic conditions. Patients frequently express high satisfaction with AYUSH modalities, often highlighting advantages such as effective pain management, improved appetite, and a decreased reliance on allopathic medications, primarily attributed to a lower incidence of side effects and reduced costs. While governmental frameworks

like the National Health Policy 2017 and the National AYUSH Mission have undeniably advanced the mainstreaming of traditional medicine systems, persistent obstacles remain. These challenges encompass limited awareness among modern healthcare practitioners, a need for standardized treatment protocols, and insufficient research into the synergistic effects of these integrated approaches.

This dissertation concludes that a multifaceted approach is crucial for effectively integrating Ayurveda and Yoga into India's framework for Non-Communicable Disease (NCD) control. This approach should encompass several key areas: policy reform, the standardization of integrative care models, enhanced training for healthcare professionals, rigorous research, and comprehensive public awareness campaigns. By adopting such a strategy, India can not only improve health outcomes for its citizens but also alleviate economic burdens and empower individuals to actively participate in managing their own health..

Keywords: Non-Communicable Diseases, Ayurveda, Yoga, Integrated Medicine, India

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Abbreviations

- **AHA: American Heart Association**
- **AI-ACIHR: Ayush-ICMR Advanced Centre for Integrative Health Research**
- **AIIA: All India Institute of Ayurveda**
- **AIIMS: All India Institutes of Medical Sciences**
- **AYUSH: Ayurveda, Yoga & Naturopathy, Unani, Siddha, and Homoeopathy**
- **BCC: Behavior Change Communication**
- **BMI: Body Mass Index**
- **CAD: Coronary Artery Disease**
- **CCRAS: Central Council for Research in Ayurvedic Sciences**
- **CHC: Community Health Centre**
- **CHD: Coronary Heart Disease**
- **CHF: Congestive Cardiac Failure**
- **COPD: Chronic Obstructive Pulmonary Disease**
- **CRD: Chronic Respiratory Disease**
- **CRF: Cancer-Related Fatigue**
- **CRIYN: Central Research Institute of Yoga & Naturopathy**
- **CSIR: Council of Scientific and Industrial Research**
- **CSO: Civil Society Organization**
- **CVD: Cardiovascular Disease**

- **DH: District Hospital**
- **DM: Diabetes Mellitus**
- **HPA: Hypothalamic-Pituitary-Adrenal**
- **ICMR: Indian Council of Medical Research**
- **IEC: Information, Education, and Communication**
- **IGIB: Institute of Genomics and Integrative Biology**
- **LVEF: Left Ventricular Ejection Fraction**
- **MIS: Management Information System**
- **MoH&FW: Ministry of Health and Family Welfare**
- **MoU: Memorandum of Understanding**
- **MSAP: National Multisectoral Action Plan**
- **NAM: National AYUSH Mission**
- **NCD: Non-Communicable Disease**
- **NHP: National Health Policy**
- **NP-NCD: National Programme for Prevention and Control of Cancer, Diabetes, Cardiovascular Diseases and Stroke**
- **OPD: Outpatient Department**
- **PFR: Peak Expiratory Flow Rate**
- **PHC: Primary Health Centre**
- **PPP: Public-Private Partnership**
- **PR: Pulmonary Rehabilitation**

- **RCT: Randomized Controlled Trial**
- **SDG: Sustainable Development Goal**
- **SDUAHER: Sri Devaraj Urs Academy of Higher Education and Research**
- **SOP: Standard Operating Procedure**
- **TM: Transcendental Meditation**
- **TMC: Tata Memorial Centre**
- **WHO: World Health Organization1**

Contents

INTRODUCTION

he Role of Integrated Ayurveda and Yoga in Addressing the Non-Communicable Disease Epidemic in India: A Comprehensive Analysis Focusing on Preventative and Curative Approaches

I. Executive Summary

India is facing a considerable and deteriorating public health issue due to the rising incidence of NCDs (Non-Communicable Diseases). Conditions including Chronic respiratory conditions, diabetes, cancer, and heart disease are all seriously affecting the nation's health and general well-being[1]. This growing crisis necessitates immediate and thorough intervention to alleviate its serious effects on individuals, families, and the healthcare infrastructure.[1] These chronic conditions impose a profound burden, contributing significantly to widespread illness (morbidity), premature deaths (mortality), and considerable economic strain across the nation. The human cost is immense, with individuals and families facing prolonged periods of ill health, reduced quality of life, and the devastating loss of loved ones. Concurrently, the economic repercussions are substantial, encompassing soaring healthcare expenditures, lost productivity due to illness and premature mortality, and a detrimental impact on national development.[1] In India, non-communicable diseases (NCDs) account for around 63% of all fatalities, making them the leading cause of death. Cardiovascular diseases are a significant contributor to this category, contributing to around 28% of all deaths in the nation.[2]This epidemiological trend highlights a critical public health challenge, necessitating comprehensive interventions and strategic public health initiatives to mitigate the rising burden of NCD-related deaths.

Chronic respiratory diseases contribute to 12 % of deaths , cancers to 9% and diabetes to 3%.The prevalence of diabetes increased from 7.1 % in 2009 to 10.1%in 2021,affecting over 100 million individuals , with an additional 15.3% of the population experiencing pre diabetic conditions.[2] Furthermore, nearly 30% of Indian adults suffer from hypertension, making it one of the countries

with the highest prevalence rates.[2] This growing burden can be primarily linked to factors including swift urbanization, inactive lifestyles, poor dietary habits, the use of tobacco and alcohol, as well as heightened psychosocial stress.[2]

There are significant economic ramifications to India's rising non-communicable disease (NCD) incidence. The costs related to the treatment of NCDs can be overwhelming, frequently consuming an estimated 80%-90% of an individual's yearly income. This financial strain is so severe that it pushes approximately 7% of India's population below the poverty line each year.[4] This heavy economic impact underscores the urgency for a cost effective, widely accessible and sustainable prevention and management strategies. The chronic nature of NCDs means their cumulative impact often goes unnoticed until later stages, silently eroding economic stability and human potential. This situation highlights the critical need for interventions that are not only medically effective but also economically viable and culturally acceptable. In light of the growing health crisis, conventional Indian practices like Ayurveda and Yoga present encouraging, comprehensive approaches for the prevention and management of non-communicable diseases.[1] These systems emphasize lifestyle modifications, personalized interventions, and mind-body harmony, aligning well with the long-term management required for NCDs.[1] There’s a growing understanding of the potential of Ayurveda and Yoga as complementary therapies .In fact India has already implemented prorams that integrate these traditional systems with national initiatives aimed at controlling Non Communicable Diseases.[5] This represents a strategic shift towards a complementary paradigm, acknowledging that conventional Western medicine, while crucial for acute care, may benefit from the comprehensive, lifestyle-focused interventions offered by traditional systems for the long-term management of NCDs. This approach, which strategically brings together different healthcare methods, can enable people to become more actively involved in managing their own health and contribute to a more accessible and comprehensive healthcare system.

Indian government National Health Policy 2017 and the National AYUSH Mission, actively advocate for their incorporation into the mainstream healthcare framework.[6] The NP-NCD-

AYUSH integration project, for instance, has demonstrated significant reductions in blood sugar levels for prediabetic and type 2 diabetic patients when Ayurvedic interventions are combined with lifestyle modification and Yoga.[7] Patients generally perceive AYUSH treatments and Yoga positively, citing benefits such as pain relief, improved appetite, reduced weakness, and a decreased reliance on allopathic medicines due to lower costs and fewer side effects.[8] Despite government efforts, including the National Health Policy 2017 and the National AYUSH Mission, which seek to incorporate traditional Indian medical systems into conventional healthcare, considerable obstacles remain. These include a lack of awareness among modern medical practitioners regarding AYUSH, an absence of standardized treatment protocols, and insufficient research into how traditional and modern medicines interact synergistically.[6]

To strengthen this integration, evidence-based recommendations are crucial. To effectively integrate traditional and modern medicine several key strategies are essential. This involves adopting comprehensive integrative care models that truly combine the philosophies of both systems, along with standardizing treatment protocols to ensure consistent quality and. Furthermore, enhancing training for healthcare professionals across all disciplines is crucial for fostering collaboration. Moreover, it is essential to promote thorough research aimed at creating a solid evidence foundation for traditional therapies, especially regarding their combined effects with contemporary medications.

Finally, increasing public awareness and community engagement will help to educate individuals about the benefits of integrated healthcare and encourage their active participation.[6] Building a truly "integrative ecosystem" necessitates a multi-faceted approach, simultaneously addressing policy frameworks, research endeavors, professional training, public awareness campaigns, and collaborative healthcare models. This comprehensive effort is crucial to overcome existing interconnected challenges and fully leverage the potential benefits of integrating Ayurveda and Yoga into mainstream healthcare.

II. India's Silent Epidemic: The Growing Challenge of NCDs

The Widespread Impact of Non-Communicable Diseases

Rationale for Exploring Integrated Traditional Medicine Approaches

Although contemporary medicine is undeniably vital in combating the prevalence of Non-Communicable Diseases, its primary emphasis often tends to be on immediate intervention and the management of symptoms. When dealing with chronic conditions like Non-Communicable Diseases, which require continuous management and are often affected by lifestyle decisions, there is an increasing acknowledgment of the necessity for a more comprehensive and sustainable strategy. [1]. The deeply rooted traditional Indian systems of Ayurveda and Yoga present promising, holistic strategies for both preventing and managing these pervasive chronic health conditions.[1] The fundamental tenets of these methodologies—which emphasize lifestyle modifications, personalized treatment, and fostering a balance between mind and body—are exceptionally aligned with the intricacies involved in the management of Non-Communicable Diseases.[1]

The growing involvement with integrative therapies, including Yoga, for the prevention and management of non-communicable diseases effectively tackles the challenges posed by swift urbanization, changing lifestyles, and increased stress levels in modern society.[2] This is not merely about adding more treatment options; it represents a recognition that conventional Western medicine, while highly effective in many areas, may not be sufficient on its own to tackle the complex, multifactorial nature of NCDs. The emphasis within Ayurveda and Yoga on holistic well-being, lifestyle changes, and the intricate connection between mind and body points towards a paradigm shift in healthcare. This shift moves beyond a reactive model focused solely on disease symptoms to a proactive approach that cultivates overall health and resilience. This perspective suggests a strategic move towards a "dual form of medicine" [8], where traditional systems are not just alternatives but integral components of a broader, more effective healthcare strategy for NCDs, particularly in a culturally rich context like India where these systems are deeply embedded and widely accepted.

Overview of the Report's Scope and Objectives

This report meticulously examines the potential for incorporating Ayurvedic principles, specifically Dinacharya (daily regimens) and Ritucharya (seasonal regimens), alongside various Yogic practices, in efforts to alleviate the escalating burden of Non-Communicable Diseases within India. The primary focus is on preventative strategies, while also giving due consideration to curative aspects.[1]

The analysis evaluates the current level of integration of Ayurveda and Yoga within existing government healthcare facilities and initiatives aimed at NCD management.[1] It further assesses the effectiveness of current policy-level implementations by the Indian government in promoting integrated medicine for NCDs.[1] Additionally, the report explores the perceived benefits and challenges of adopting Ayurvedic and Yogic interventions for NCD prevention and management from the perspectives of both healthcare providers and the community.[1] The core aim is to offer recommendations, supported by evidence, for more robustly incorporating Ayurveda and Yoga into India's national healthcare system, with the goal of enhancing NCD control efforts.

REVIEW OF LITREATURE

III. Foundational Principles of Ayurveda and Yoga for Health and Disease Prevention

Ayurvedic Principles

Ayurveda, an ancient holistic healthcare system, posits that illness stems from imbalances in three energetic principles (doshas: Vata, Pitta, Kapha) and the accumulation of metabolic waste (Ama). Its core focus, unlike Western medicine, is to address these root causes for both prevention and cure.[9,10]

Central to Ayurvedic preventive medicine are specific daily and seasonal regimens:

- **Dinacharya (Daily Regimens)**:Dinacharya outlines daily routines for physiological balance and disease prevention.[1] These practices, including specific diet, sleep, hygiene, and activities like waking at Brahma muhurta (early morning), drinking warm water, exercising, meditating, and mindful eating, synchronize the body's clock with natural rhythms.[9] This disciplined lifestyle reduces lifestyle-related disorders.[9]
- **Ritucharya (Seasonal Regimens)**: Ritucharya prescribes seasonal lifestyle and dietary adjustments to adapt the body to changing seasons, balancing doshas, and preventing seasonal and chronic ailments.[12] Adhering to these guidelines promotes digestion, immunity, and overall health, mitigating lifestyle disease risk by maintaining harmony with nature's cycles.[13]

Ayurveda also identifies three essential pillars supporting health, known as *Trayopastambha*:

Ayurveda highlights

Ayurvedic preventive medicine hinges on daily (Dinacharya) and seasonal (Ritucharya) regimens, promoting physiological balance and preventing ailments by aligning the body with natural rhythms. Its "three pillars" of health (Trayopastambha) include Ahara (Diet), considered "great medicine," emphasizing wholesome, dosha-appropriate foods; Nidra (Adequate Sleep), crucial for metabolic, immune, and mental health; and Brahmacharya (Self-control) for longevity. Beyond these, therapeutic procedures like Panchakarma (Detoxification) cleanse the system, Rasayana boosts intellect and strength against lifestyle diseases, and Satvritta (Ethical Living) and Achara Rasayana (Lifestyle Ethics) cultivate inner harmony and well-being.[9],[12],[1]

Table 1: Key Ayurvedic Principles and their Role in NCD Prevention

Principle	Definition/Description	Role in NCD Prevention
Dosha Balance (Vata, Pitta, Kapha)	These represent the three core biological energies that regulate both physiological and psychological processes within the body.	Maintaining equilibrium prevents disease; imbalance leads to NCDs by disrupting bodily processes and accumulating toxins (Ama).
Agni (Digestive Fire)	The metabolic fire responsible for digestion, absorption, and assimilation of food and experiences.	Strong Agni prevents Ama formation, which is a key contributor to chronic diseases like cancer and diabetes.[15]
Ama (Toxins)	Undigested metabolic waste or toxins that accumulate due to weak Agni or improper lifestyle.	Reducing Ama prevents its accumulation, which is considered a root cause of various NCDs.[10]
Dinacharya (Daily Regimens)	A prescribed daily routine for diet, sleep, hygiene, and activities.	Maintains biological clock, harmonizes circadian rhythms, and promotes consistent healthy habits to prevent lifestyle disorders.[1]

Principle	Definition/Description	Role in NCD Prevention
Ritucharya (Seasonal Regimens)	Lifestyle and dietary adjustments according to different seasons.	Helps the body adapt to seasonal changes, maintains Dosha balance, promotes proper digestion, and enhances immunity, reducing risk of seasonal and chronic diseases.[1]
Ahara (Diet)	Guidelines for wholesome and nutritious food consumption, balancing tastes and properties.	Considered "Mahabhaisajya" (great medicine); provides energy, supports tissue growth, aids healing, and prevents diseases arising from improper diet or incompatibilities.[9]
Nidra (Adequate Sleep)	Quality and consistent sleep patterns.	Vital for managing lifestyle disorders by impacting metabolism, immune function, and hormonal balance.[9]
Brahmacharya (Self-control)	Balanced fulfillment of physical desires and self-discipline.	Promotes longevity and preserves overall health by maintaining vital energy and mental clarity.[9]
Panchakarma (Detoxification)	Five primary purification procedures (Vamana, Virechana, etc.) to cleanse the body.	Eliminates accumulated Doshas and toxins, enhancing the body's self-recovery capacity and preventing chronic disease progression.[9]
Rasayana (Rejuvenation)	Specific treatments to nourish tissues, balance Doshas, and boost immunity.	Enhances physical strength, intellect, and quality of life, preventing age-related and lifestyle-related diseases.[9]
Satvritta/Achara Rasayana (Ethical Living/Lifestyle Ethics)	Practices cultivating mental harmony, good conduct, and psychological well-being.	Promotes social health, reduces stress, and strengthens mental resilience, which are crucial for preventing stress-related NCDs.[9]

Yogic Practices

Yogic practices offer a comprehensive system for well-being and disease prevention, integrating ethical guidelines (Yamas, Niyamas), physical postures (Asanas), breathing techniques (Pranayama), and meditation (Dhyana).[11],[1] This mind-body connection alleviates stress, a key NCD risk factor, by regulating cognitive and emotional states, normalizing stress response, and releasing tension.[3] ,[20] Physically, yoga enhances flexibility, muscle tone, joint health, circulation, and aids weight management, including reducing visceral fat, crucial for preventing Type 2 diabetes.[20],[3] Physiologically, yoga decreases HPA axis activation, modulates heart rate and the cardiac axis, normalizes neuro-immune biomarkers, and regulates the Ghrelin axis, improving metabolic health.[21] As a holistic, multi-target intervention, yoga reduces NCD risk by positively impacting stress hormones, autonomic function, inflammation, and metabolic parameters (blood glucose, lipids, weight), making it a cost-effective public health tool for prevention and management.[2,3]

Table 2: Key Yogic Practices and their Therapeutic Effects on NCDs

Category	Specific Practice	Therapeutic Effect on NCDs
Asanas (Physical Postures)	Surya Namaskaram (Salutation to the Sun)	The intervention promotes insulin synthesis, contributes to a reduction in hip circumference, and is beneficial for glycemic regulation.[3]
	Paschimutthanasana (Seated Forward Bend)	Stimulates and applies pressure to the pancreas, which may enhance insulin production.[3]
	Ardha Matsyendrasana (Half Spinal Twist)	Stimulates the pancreas, potentially boosting insulin production.[3]
	Bhujangasana (Cobra Pose), Dhanurasana (Bow Pose), Ushtrasan (Camel Pose), Vajrasana (Thunderbolt Pose), Naukasana (Boat Pose), Setubandhasana (Bridge Pose), Pavanamuktasana (Wind-Relieving Pose)	These interventions facilitate the regeneration of pancreatic cells, enhances muscular blood flow, increases the expression of insulin receptors, and aids in glucose metabolism as well as the redistribution of adipose tissue.[3]
	General Asanas (Forward bends, Backward bends, Twists, Inversions)	Improve blood circulation, rejuvenate pancreatic cells, enhance insulin sensitivity, affect glucose utilization and fat redistribution.[3]
Shuddhi Kriyas (Cleansing Processes)	Vamana Dhauthi (Cleansing of the stomach)	The intervention augments glucose uptake, minimizes insulin insensitivity, promotes insulin efficacy, and reduces both fasting and postprandial glycemia.[3]
	Shankha Prakshalana (Intestine Cleansing)	The intervention results in a notable reduction in blood glucose concentrations and an augmentation of insulin synthesis.[3]

Category	Specific Practice	Therapeutic Effect of NCDs
	Kapalbhati (Frontal Brain Purification)	Improves efficiency of pancreatic β-cells, aids insulin production and blood glucose control through abdominal pressure.[23]
	Agnisar Kriya (Stimulating Digestive Fire)	Massages internal organs, increases blood flow, boosts metabolism, facilitates abdominal organ function.[23]
Pranayama (Regulated Breathing)	Anulom-Vilom (Alternate Nostril Breathing Excercise)	The intervention contributes to enhanced cardiorespiratory endurance, improved flexibility, and a more favorable body fat composition, concurrently augmenting cerebral perfusion and oxygenation.[3]
	Bhramari (Humming Bee Breathing Excercise)	It exerts a tranquilizing and calming influence on the psyche, thereby fostering enhanced mental and physiological well-being.[3]
	Sheetali/Sheetakari (Cooling Breath)	The intervention contributes to reduced arterial pressure and elicits a refrigerating sensation.[3]
	Chandra Bhedana (Breathing through Left Nostril)	It promotes parasympathetic nervous system engagement.[3]
	Surya Bhedana (Breathing through Right Nostril)	The intervention exhibits a sympathomimetic effect and may therefore be indicated for individuals with diabetes.[3]
	Bhastreka (Bellowing Breath)	It regulates the function of the pineal, pituitary, and adrenal glands, which play a crucial role in the control of metabolism.[3]

Category	Specific Practice	Therapeutic effect on NCDs
Bandhas (Locks)	Uddiyana Bandha (Abdominal Lock)	Intriguing evidence suggests that a reduction in intra-abdominal pressure may positively influence pancreatic functionality.[23]
Hasta Mudras (Hand Gestures)	Apana Mudra, Gyana Mudra	The intervention is conducive to profound relaxation and the amelioration of stress.[3]
	Linga Mudra, Surya Mudra, Prana Mudra	It is widely held to accelerate metabolic processes, foster adipose tissue reduction, and diminish glycemia.[23]
Dhyana & Yogic Relaxation	Dhyana (Meditation)	The intervention confers advantageous psychological outcomes, manifesting as accelerated reaction times and attenuated stress. Furthermore, it contributes to anxiety reduction, blood pressure regulation, and salutary effects on glycemic parameters.[3]
	Yoga Nidra (Yogic Relaxation)	The intervention contributes to ameliorated symptom indices and diminished fasting and postprandial glycemia.[23]
	Aum Chanting	The intervention promotes cerebral stability, mitigates intrusive negative cognitions, augments vitality, cultivates enhanced somatic and psychological tranquility, and facilitates the integrated relaxation response.[23]
	Sudarshana Kriya	The intervention facilitates improvements in physical, psychological, and social areas, resulting in a better overall quality of life for individuals with diabetes.[23]

IV. Ayurveda and Yoga in NCD Prevention and Management: A Disease-Specific Analysis

A. Cardiovascular Diseases

Cardiovascular diseases (CVDs) represent a significant component of the NCD burden in India. Both Ayurveda and Yoga offer distinct yet complementary approaches to their prevention and management.

Ayurvedic Perspective (Hridroga)

In Ayurveda, Cardiovascular Diseases (CVDs) broadly correlate with Hridroga, encompassing five types: Vataja, Pittaja, Kaphaja, Tridoshaja (dosha-dominant), and Krimija (worm infestation).[17] The heart (Hridaya), a vital thoracic organ, is connected to ten Mahadhamnies, supplying the body with blood, oxygen, and nutrition.[17]

Hridroga causes (Nidana) are multifaceted, including excessive physical exertion (Vyayama), pungent food (Tikshna Ahara), and improper therapeutic procedures like purgation or enema.[17] Secondary causes involve emaciation, excessive worry, stress, or fear, along with direct trauma (Abhighata), leading to Kapha kshaya and Rasa kshaya, impairing heart function.[17]

Ayurveda identifies both modifiable (hypertension, obesity, smoking, diabetes, high cholesterol, psychosocial factors) and non-modifiable (ethnicity, age, gender, family history) CVD risk factors, aligning with modern medicine.[17] Ayurvedic texts describe CVD symptoms as dyspnoea, orthopnoea, peripheral oedema, palpitation, and chest pain.[17]

Ayurvedic Management

Ayurveda prioritizes Hridroga (CVD) prevention, emphasizing "Prevention is better than cure."[17] Strategies focus on stress avoidance, healthy daily routines (Swasthyavritta Palana), and specific dietary (Ahara) and lifestyle (Vihara) modifications.[17] Cardioprotective Naimittika Rasayana drugs like Arjuna, Pushkarmula, and Tambula reduce cardiac disease propensity.[17] Additionally, Amalaki and Haritaki are valued for their anti-hyperlipidemic and anti-hypertensive actions, crucial for preventing coronary artery disease, ischemic heart disease, and acute myocardial infarction.[17] Beneficial Rasayana formulations such as Amalaki Rasayana, Brahma Rasayana, Agastaya Haritaki Rasayana, Chyavanprasha Rasayana, and Shilajeet Rasayana are also utilized.[17]

Table 3: Summary of Ayurvedic Interventions for Cardiovascular Diseases

Category	Details/Examples	Reported Effects/Benefits
Ayurvedic Concept of CVD (Hridroga)	Correlated with Hridroga (Vataja, Pittaja, Kaphaja, Tridoshaja, Krimija types).[17] Causes: excessive physical exertion, pungent food, therapeutic imbalances, stress, fear, trauma.[17] Risk factors: modifiable (hypertension, obesity, smoking, diabetes, high cholesterol, psychosocial factors) and non-modifiable.[17] Symptoms: dyspnoea, orthopnoea, peripheral oedema, palpitation, chest pain.[17]	Understanding of disease etiology from a holistic perspective, linking lifestyle and mental factors to cardiac health.[17]
Preventive Measures	Emphasis on "Prevention is better than cure".[17] Avoidance of stress factors, adherence to healthy routines (Swasthyavritt Palana), Ahara (diet) and Vihara (lifestyle) modifications.[17] Specific Rasayana drugs (Arjuna, Pushkarmula, Tambula) and preparations (Amalaki Rasayana, Chyavanprasha Rasayana).[17]	Cardioprotective and cardiotonic properties, anti-hyperlipidemic and anti-hypertensive effects, reducing tendency to develop cardiac diseases.[17]
Samshodhana (Purification) Therapies	Virechana Karma (purgation).[17] Basti Therapy (Lekhana Basti, Tikta Basti, Brinhana/Ksheera Basti).[17]	Beneficial in hyperlipidemia, hypertension, and Krimija Hridroga. Addresses obesity, ischemic heart diseases, CHF, and cardiac arrhythmias.[17]
Shamana (Pacifying) Therapies	Tailapana (oil cooked with drugs) for Vataja Hridroga.[17] Ghritapana (ghee cooked with drugs) and Pittahara drugs for Pittaja Hridroga.[17] Langhana (fasting), Ama-Pachana (digesting toxins), Katu (pungent) drugs for Kaphaja Hridroga.[17]	Pacifies aggravated Doshas, manages specific Hridroga types based on Dosha predominance.[17]

Yoga's Role

Yoga demonstrates significant potential in controlling cardiovascular disease, offering benefits for both primary and secondary prevention.

Yoga demonstrates notable efficacy in primary CVD prevention by mitigating lifestyle stressors and improving risk factors like adiposity, dyslipidemia, hypertension, and diabetes.[24] Transcendental Meditation, a yoga form, significantly reduces blood pressure, acknowledged by the AHA for lowering CVD morbidity and mortality, via sympathetic nervous system reduction and baroreceptor reflex enhancement.[24] For secondary prevention, consistent yoga/meditation reduces early atherosclerosis, and in advanced CHD, combined with diet, can decelerate or even regress coronary obstructions, reducing intervention needs, improving lipid profiles, and alleviating angina.[24] In cardiac rehabilitation, yoga improves physical conditioning, reduces stress, and enhances well-being, showing benefits like improved LVEF and reduced anxiety post-bypass grafting.[24] For smoking cessation, integrated yoga (asanas, pranayama, sattvic diet) demonstrates an 88% success rate, significantly improving blood pressure, heart rate, BMI, and reducing acute myocardial injury and cerebrovascular accident risk.[26]

The integration of Ayurveda and Yoga offers a synergistic, multi-targeted CVD intervention. Ayurveda, with its focus on dosha balance, herbal remedies, and detoxification, provides a constitutional and dietary framework.[10] Yoga directly impacts physiological parameters like blood pressure, stress, and lipid profiles.[24] This combined approach, where Ayurveda's dietary and lifestyle principles complement Yoga's physical and stress-reduction techniques, targets CVD from both etiological and symptomatic perspectives, leading to more profound and sustainable reductions in disease burden than either system alone.[17],[24]

Table 4: Summary of Yogic Interventions for Cardiovascular Diseases

Category	Details/Examples	Reported Effects/Benefits
Primary Prevention	Ameliorating lifestyle-induced psychological burdens.[24] The practice contributes to the improvement of various significant risk factors, including body weight, lipid profiles, blood pressure, smoking habits, psychosocial stress, and Type 2 diabetes.[24] Transcendental Meditation (TM).[24] Integrated yoga for smoking cessation.[26]	A notable decrease in systolic blood pressure (4.7 mm Hg) and diastolic blood pressure (3.2 mm Hg).[24] AHA recognizes TM for lowering BP and reducing heart attacks, stroke, and deaths.[24] 88% smoking cessation rate, reduced BP, HR, BMI, It conferred a 38% attenuation in the risk of acute myocardial injury and cerebrovascular accident.[26]
Secondary Prevention	It contributes to an attenuation of risk across all-cause mortality, myocardial infarction, and cerebrovascular events.[24] Reduction of early atherosclerosis (carotid intimal medial thickness).[24] Retardation/regression of coronary obstructions with low-fat vegetarian diet.[24] Reduced need for interventional procedures.[24]	48% risk reduction in composite primary endpoint.[24] Significant reduction in LDLc, triglycerides, angina, and exercise-induced ischemia.[24]
Mechanisms of Action	The intervention contributes to an attenuation of sympathetic nervous system activation, a re-establishment of baroreceptor sensitivity, a decrease in physiological excitability, and optimized somnolence and appetitive regulation.[24]	Contributes to BP reduction and overall well-being, supporting cardiac health.[24]
Cardiac Rehabilitation	Yoga-based cardiac rehabilitation, administered post-coronary bypass surgery, contributes to augmented physical conditioning, stress attenuation, and enhanced holistic well-being.[24]	Improved LVEF, lipid profiles, reduced hyperglycemia, decreased stress, anxiety, and depression.[24]

B. Diabetes Mellitus

Diabetes Mellitus (DM) is a rapidly growing health concern in India, and both Ayurveda and Yoga offer comprehensive strategies for its prevention and management, often extending beyond conventional glycemic control.

Ayurvedic Understanding (Madhumeha)

Ayurveda links Diabetes Mellitus to Madhumeha, an imbalance of Kapha and Vata doshas leading to metabolic disturbances, Ama accumulation, and Dhatu Kshaya.[27],[28] Treatment involves specific Ahara (Diet), emphasizing whole grains and bitter vegetables while restricting sugary/fatty foods.[28] Vihara (Lifestyle) promotes physical activity for insulin sensitivity and stress reduction.[28] Aushadha (Herbal Medicines) utilize over 1,200 botanicals like Gymnema sylvestre and Curcuma longa, polyherbal formulations, and marine algae to enhance pancreatic function and insulin sensitivity.[28] Case studies demonstrate significant HbA1c reductions and recovery.[27],[28]

Yoga's Role

Yoga significantly aids Diabetes Mellitus prevention and management by improving blood glucose and metabolic control (reducing glucose, lipids, oxidative stress, adiposity, enhancing insulin sensitivity).[3] It achieves stress reduction via pranayama and meditation, mitigating cortisol effects on glucose and improving psychological well-being.[3] Specific Asanas stimulate pancreatic function and insulin synthesis; Shuddhi Kriyas enhance glucose uptake and metabolic efficiency; Pranayama techniques optimize cardiorespiratory function and regulate metabolism; and Bandhas/Mudras support pancreatic health and relaxation.[3] Overall, Yoga improves physical fitness, stress response, and hormonal balance.[23]Integrating Ayurveda and Yoga offers holistic metabolic restoration. Ayurveda regenerates pancreatic cells and addresses metabolic disturbances,[28] while Yoga rejuvenates cells and enhances insulin sensitivity.[23] Both emphasize lifestyle and stress reduction, providing a comprehensive strategy that targets systemic dysfunction, as validated by successful integration projects, leading to better long-term diabetes management.[3],[7]

Table 5: Summary of Ayurvedic Interventions for Diabetes Mellitus

Category	Details/Examples	Reported Effects/Benefits
Ayurvedic Understanding (Madhumeha)	Madhumeha (subtype of Prameha); imbalances of Kapha and Vata Doshas; depletion of Agni; disturbance in Meda metabolism; lowering of Ojas; accumulation of Ama; Dhatu Kshaya.[27]	Holistic understanding of diabetes etiology, linking metabolic and energetic imbalances to disease progression.[27]
Dietary Interventions (Ahara)	Barley (Yava), old rice (Purana Shali), bitter vegetables (Karela, fenugreek); avoidance of sugary/fatty foods; avoidance of Kapha-aggravating foods.[28]	Regulates blood sugar, improves digestion, prevents toxin accumulation, vital for managing Prameha.[28]
Lifestyle Interventions (Vihara)	Regular physical activity (walking, yoga, aerobic exercises); engaging in Vyayama.[28]	Improves insulin sensitivity, controls weight, reduces stress, restores stability in the body.[28]
Herbal Medicines (Aushadha)	Common Herbs: Gymnema sylvestre (Gurmar), Momordica charantia (Bitter Gourd), Curcuma longa (Turmeric), Mamajjaka, Amalaki, Guduchi, Fenugreek, Pterocarpus marsupium, Neem, Salacia chinensis (Saptachakra), Shilajit, Aloe vera, Licorice.[28] Polyherbal Formulations: Diabecon, Saptachakradi Choorna, Phalatrikadi Kwath.[28] Red and brown varieties of marine algae.[28]	The operational mechanism encompasses the regeneration of pancreatic cells, the enhancement of insulin secretagogue activity, the improvement of insulin sensitivity, and the regulation of glycemia. Simultaneously, it demonstrates anti-inflammatory and antioxidant properties..[28] Polyherbal formulations show remarkable anti-diabetic effects.[28]
Case Study Outcomes	23-year-old female with Madhumeha: speedy recovery with Sanshamana Aushadhi, Udvartana, Virechanakarma, Nidanaparimarjana alongside insulin.[27] HbA1c reduction from 14.87% to 6.05% with Katakakhadiradi Kashayam and Chandraprabha Vati.[28] NP-NCD-AYUSH integration: significant reduction in FBS and PPBS with Ayurveda intervention, lifestyle modification, and Yoga.[7]	The intervention demonstrates clinical efficacy in attenuating glycemia, ameliorating subjective symptomatology, and exhibiting the potential for diabetes remission.[7]

Table 6: Summary of Yogic Interventions for Diabetes Mellitus

Category	Specific Practice	Therapeutic Effect on Diabetes
Asanas (Physical Postures)	Surya Namaskar, Tadasana, Paschimottanasana, Dhanurasana, Bhujangasana, Ushtrasan, Vajrasana, Naukasana, Setubandhasana, Pavanamuktasana, Yoga Mudra, Ardhamatsyendrasan, Vakrasan, Sarvangasan, Halasan	The intervention is observed to stimulate insulin synthesis, facilitate the rejuvenation of pancreatic cellular function, augment muscular vascularization, and enhance insulin receptor expression. It further promotes increased glucose cellular uptake, optimizes glucose metabolic utilization and adipose tissue redistribution, provides pancreatic compression and massage, and improves systemic hemodynamics.[3]
Shuddhi Kriyas (Cleansing Processes)	Vamana Dhauti (Cleansing of Stomach)	The intervention enhances the uptake of glucose by cells, reduces insulin resistance, and facilitates insulin function by lowering the levels of circulating free fatty acids. Collectively, this results in a significant decrease in both fasting and postprandial blood glucose levels.[3]
	Shankha prakshalana (Cleansing of Intestine)	The intervention markedly attenuates glycemia and augments insulin synthesis.[3]
	Kapalbhati (Frontal Brain Purification)	Improves efficiency of pancreatic β-cells, aids insulin production and blood glucose control through abdominal pressure.[23]
	Agnisar Kriya (Stimulating Digestive Fire)	Massages internal organs, increases blood flow, boosts metabolism, facilitates proper abdominal organ function.[23]

Category	Specific Practice	Therapeutic Effect on NCDs
Pranayama (Regulated Breathing)	Anulom Vilom (Alternate Nostril Breathing)	The intervention contributes to enhanced cardiorespiratory endurance, increased musculoskeletal flexibility, favorable modulation of adiposity, and augmented cerebral perfusion and oxygenation.[3]
	Bhramari (Humming Bee Breath)	The intervention elicits a tranquilizing and pacifying effect upon cognitive processes, subsequently contributing to enhanced psychological and physiological well-being.[3]
	Sheetali/Sitkari (Cooling Breath)	It contributes to the attenuation of systemic arterial pressure and imparts a thermoregulatory cooling effect.[3]
	Chandra Bhedana (Breathing through Left Nostril)	It elicits parasympathetic nervous system afferent or efferent activation.[3]
	Surya Bhedana (Breathing through Right Nostril)	The intervention exhibits a sympathetic stimulating effect and warrants consideration for therapeutic application in diabetes mellitus.[3]
	Bhastrika (Bellows Breath)	This intervention influences the functioning of the pineal, pituitary, and adrenal glands, a mechanism essential for maintaining systemic metabolic homeostasis.[3]
Bandhas (Locks)	Uddiyan Bandha (Abdominal Lock)	The negative pressure within the thoracic cavity may have beneficial effects on the functioning of the pancreas.[23]

Category	Specific Practice	Therapeutic effect on NCDs
Hasta Mudras (Hand Gestures)	Apan Mudra, Gyan Mudra	The intervention facilitates profound relaxation and mitigates stress.[3]
	Linga Mudra, Surya Mudra, Prana Mudra	The intervention is hypothesized to augment metabolic rates, facilitate adiposity reduction, and attenuate circulating glucose concentrations.[23]
Dhyan (Meditation) & Yogic Relaxation	Dhyan (Meditation)	The intervention confers salubrious psychological effects, facilitates accelerated responsiveness to stimuli, reduces susceptibility to physiological and psychological stressors, attenuates anxiolytic states, modulates systemic arterial pressure, and exerts propitious influences upon glycemic parameters.[3]
	Yoga Nidra (Yogic Relaxation)	The intervention ameliorates symptomatology and attenuates both fasting and postprandial glycemia.[23]
	Aum Chanting	The intervention supports brain stability, helps to diminish negative thinking, increases personal vitality, and leads to deeper mental and physical relaxation.[23]
	Sudarshan Kriya	The intervention yields substantial amelioration across physical, psychological, and social domains, and contributes to an enhanced holistic quality of life in patients afflicted with diabetes.[23]

C. Cancers

Cancer is a major NCD with a rising incidence globally, including in India. Both Ayurveda and Yoga offer unique contributions to cancer prevention and supportive management, often focusing on holistic well-being and mitigating treatment side effects.

Ayurvedic Perspective

Ayurveda views cancer as a *tridoshic* illness, indicating an imbalance of all three *doshas*—Vata, Pitta, and Kapha.[15] This imbalance is believed to result in the growth of tumors, referred to as "granthi" and "arbuda".[15] The pathophysiology of cancer in Ayurveda involves several key aspects: vitiation of *doshas*, diminished *Agni* (digestive fire) leading to the buildup of *Ama* (toxins), and *Dhatu Kshaya* (tissue depletion), which weakens the body's natural defenses.[15]

Ayurvedic Approach

Ayurveda's comprehensive cancer approach integrates herbal therapies, dietary changes, and lifestyle modifications.Herbal Therapies utilize anti-inflammatory, antioxidant herbs like Turmeric, Ashwagandha, Tulsi, Guduchi, Amla, Ginger, and Neem, which inhibit cancer cell proliferation, promote apoptosis, enhance immunity, and reduce oxidative stress and inflammation.[15]Dietary Changes prioritize a Sattvic Diet—fresh, organic, easily digestible foods—to maintain cellular integrity and immunity, while balancing Agni (digestion) and avoiding Ama (toxins).[15]Lifestyle Modifications emphasize daily (Dinacharya) and seasonal (Ritucharya) routines, and mental/emotional well-being (Manasika Swasthya) to preserve harmony and strengthen immunity.[15]

Yoga's Role

Yoga crucially supports cancer treatment by alleviating side effects and enhancing quality of life. It effectively reduces Cancer-Related Fatigue (CRF) through biological mechanisms (lowering inflammation, regulating stress hormones, boosting immune function) and psychological mechanisms (improving mood, emotional regulation, and mindfulness).[29] Consistent yoga practice also significantly improves quality of life and numerically reduces recurrence/death risk (by 15%

in breast cancer patients), as demonstrated by a landmark Tata Memorial Centre study, highlighting its low-risk, low-cost benefits for daily functioning, pain, and fatigue.[3],[30] Furthermore, yoga effectively reduces stress by lowering cortisol levels, crucial given stress's role in cancer progression.[20] The integrated approach of Ayurveda and Yoga offers essential adjunctive and supportive cancer care. While modern medicine focuses on cure, Ayurveda aims to create an unfavorable internal environment for cancer progression and enhance resilience by balancing doshas, minimizing Ama, and utilizing anti-inflammatory/antioxidant herbs.[15] Yoga's proven efficacy in reducing CRF, improving quality of life, and reducing recurrence/mortality directly addresses treatment side effects and patient well-being.[2],[30] Both systems' shared emphasis on mental well-being and stress reduction[15] tackles the psychological burden of cancer. This holistic integration positions Ayurveda and Yoga as vital components of cancer care, improving patient experience and potentially long-term outcomes while offering cost-effective symptom management.[30]

Table 7: Summary of Ayurvedic Interventions for Cancers

Category	Details/Examples	Reported Effects/Benefits
Ayurvedic Understanding	Cancer as a tridoshic illness (imbalance of Vata, Pitta, Kapha).[15] Growth of tumors ("granthi" and "arbuda").[15] Pathophysiology: vitiation of doshas, diminished Agni (digestive fire), Ama (toxin) buildup, Dhatu Kshaya (tissue depletion).[15]	Provides a holistic framework for understanding cancer etiology, linking it to systemic imbalances and lifestyle factors.[15]
Herbal Therapies	Turmeric (Curcuma longa), Ashwagandha (Withania somnifera), Tulsi (Ocimum sanctum), Guduchi (Tinospora cordifolia), Amla (Phyllanthus emblica), Ginger (Zingiber officinale), Neem (Azadirachta indica).[15]	Anti-inflammatory, antioxidant, and anticancer activities (inhibits cell growth, induces apoptosis, modulates immune system, reduces oxidative stress, aids detoxification).[15] Curcumin enhances chemotherapy effectiveness while sparing healthy cells.[15]
Dietary Changes	Sattvic Diet: fresh, organic, easily digested foods.[15] Emphasis on Agni (digestive fire) balancing.[15] Anti-inflammatory/antioxidant-rich spices (turmeric, ginger, black pepper).[15] Regular detoxification (Panchakarma, seasonal fasting).[15] Avoidance of processed/Tamasic foods.[15]	Sustains cell integrity, enhances immunity, minimizes oxidative stress, prevents Ama formation, supports detoxification, reduces inflammation.[15]
Lifestyle Modifications	Adherence to Dinacharya (daily) and Ritucharya (seasonal) routines.[15] Emphasis on Manasika Swasthya (mental and emotional well-being).[15]	Complements natural cycles, enhances general health, reduces stress and negative thought patterns that can disrupt doshas and impair immunity.[15]

Table 8: Summary of Yogic Interventions for Cancers

Key Benefit	Details/Examples	Mechanisms/Clinical Evidence
Reduction of Cancer-Related Fatigue (CRF)	Persistent, overwhelming tiredness in up to 90% of cancer patients.[29]	Biological: Decreases inflammation markers, modulates stress hormones (cortisol), enhances immune function.[29] Psychological: Enhances mood, reduces stress, fosters emotional regulation and inner peace through mindfulness and controlled breathing (pranayama).[29] Consistent efficacy demonstrated in RCTs.[29]
Improved Quality of Life (QoL)	Enhances daily functioning, treatment adherence, and overall well-being.[29] Improves physical and mental resilience.[15]	Reduces anxiety, depression, and emotional distress, which are closely linked to CRF.[29] Low-risk, low-cost therapy that improves day-to-day activity.[30]
Reduced Recurrence & Death Risk (Breast Cancer)	Tata Memorial Centre (TMC) study findings.[30]	Numerically reduced the risk of recurrence and death by 15% in breast cancer patients.[30] Yoga protocol included gentle and restorative postures (asana) with relaxation and pranayama.[30] First rigorous randomized study of an Indian traditional remedy in this context.[30]
Stress Reduction	Yoga reduces cortisol levels and enhances psychological well-being.[20]	Crucial as stress can be a factor in cancer development.[20]

D. Chronic Respiratory Diseases

Chronic Respiratory Diseases (CRDs), including Asthma, Tuberculosis, and Chronic Obstructive Pulmonary Diseases (COPD), pose a significant health burden globally and in India, affecting both adults and children in terms of morbidity and mortality.[31] Both Ayurveda and Yoga offer distinct yet complementary approaches to their management.

Ayurvedic Management

Ayurvedic management of respiratory disorders employs a combination of *Shodhana Karma* (purification therapies) and *Shamana Chikitsa* (palliative therapies).[31]

- **Shodhana Karma**: This encompasses methods such as Vamana (therapeutic emesis) and Virechana (therapeutic purgation).[31] *Virechana Karma* is particularly emphasized for its importance in managing *Tamaka Swasa* (bronchial asthma).[31]
- **Shamana Chikitsa**: Palliative therapies are considered effective, especially when administered after *Shodhana Karma*, for conditions such as *Pratishaya* (rhinitis/catarrh) and *Tamaka Swasa*.[31]

Table 9: Summary of Ayurvedic Interventions for Chronic Respiratory Diseases

Category	Details/Examples	Reported Effects/Benefits
Types of Respiratory Disorders	Asthma, Tuberculosis, COPD (Chronic Obstructive Pulmonary Diseases).[31] Bronchial asthma, rhinitis/catarrh (Pratishaya).[31]	Addresses a significant health burden globally and in India.[31]
Shodhana Karma (Purification Therapies)	Vamana Virechana (therapeutic emesis and purgation).[31] Virechana Karma in Tamaka Swasa (bronchial asthma).[31]	Cleansing procedures that help to eliminate accumulated Doshas and toxins, crucial for managing conditions like bronchial asthma.[31]
Shamana Chikitsa (Palliative Therapies)	Administered after Shodhana Karma for Pratishaya and Tamaka Swasa.[31] Can be combined with Pranayama.[31]	Effective in pacifying symptoms and promoting recovery when combined with purification therapies.[31]
Ayurvedic Formulations (as adjuvants)	Shwaskuthar Rasa, Sitopaladi Churna, Yashtimadhu Churna, Pippalimul Churna, Kanakasav, Talisadi Churna, Tankan Bhasma, Ashwagandha Churna, Nagguti, Aamlaki Churna, Sunthi Churna, Triphala Guggul, Abhayarishta, Dashmularishta, Kravyad Rasa, Dashmul Haritaki Avaleha, Sudarshan Churna, Arogyavardhini Vati.[32]	Demonstrate significant positive outcomes on major symptoms of respiratory disorders, used as supplementary treatments.[31]

Yoga's Role

Yoga significantly aids respiratory health by calming the mind, strengthening immunity, and reducing hyper-reactivity in conditions like asthma and nasal allergies.[33] It improves lung function, oxygenation, and sputum excretion.[33] Yoga addresses airway hyper-responsiveness peripherally via Kriyas and centrally through relaxation and nervous system stabilization.[33] Pranayama consistently improves lung function and reduces asthma symptoms.[33] Its cultural acceptance in India makes it ideal for pulmonary rehabilitation.[34] Integrating Ayurveda and Yoga creates a powerful breath-body-mind approach for chronic respiratory diseases. Ayurveda targets systemic imbalances,[31] while Yoga directly improves lung function and addresses psychosomatic aspects, offering a culturally congruent and cost-effective strategy beyond symptom relief.[3],[33],[34]

Table 10: Summary of Yogic Interventions for Chronic Respiratory Diseases

Key Benefit	Details/Examples	Mechanisms/Clinical Evidence
Improved Breathing & Reduced Hyper-reactivity	Helps control mind and emotions, leading to easier breathing.[33] Reduces hyper-reactivity that triggers bronchial asthma and nasal allergy.[33]	Helps excrete sputum, increases blood oxygen levels, enhances elastic recoil of lungs, prevents recurrent infections, aerates lungs.[33] Desensitizes end receptors, corrects beta receptor sensitivity, stabilizes nervous system, reduces norepinephrine, reduces emotional stress.[33]
Strengthened Immune System	Reduces likelihood of chronic infections.[33]	Yoga strengthens the immune system.[33]
Specific Practices	Pranayama (Breathing Exercises): Anulom Vilom, Bhramari, Sheetali/Sitkari, Chandra Bhedan, Surya Bhedan, Bhastrika.[3] Asanas (Physical Postures): Various postures that aid lung function.[33] Relaxation Techniques: Yoga Nidra, Aum Chanting.[23]	Augment cerebral blood flow and oxygenation, improve neuronal activities, regulate glands crucial for metabolism, lower blood pressure, provide calming effects.[3] Significant improvement in Peak Expiratory Flow Rate (PFR) and reduction in attacks/medication for bronchial asthma.[33]
Patient Perception & Cultural Congruence	Patients believe yoga and exercise are good self-management strategies.[34] Many learn from informal sources (friends, family, YouTube).[34]	Including yoga in pulmonary rehabilitation (PR) programs could make them "culturally congruent" and more successful in the Indian context.[34]

Methodology

This chapter elucidates the methodological framework underpinning this comprehensive analysis, a study dedicated to investigating the role and potential of integrated Ayurveda and Yoga in addressing the significant and escalating public health challenge posed by the non-communicable disease (NCD) epidemic in India. The imperative for a robust methodology arises from the complexity of NCDs and the multifaceted nature of integrating traditional Indian systems of medicine with conventional healthcare. This chapter details the key research questions that guided the inquiry, the specific research design employed, the delineated study setting, the nature and scope of the study population and data sources, the systematic research procedures and approaches utilized for data assessment, precise operational definitions of key terminologies, the foundational research proposition, and the ethical considerations meticulously observed throughout the study.

3.1 Key Research Questions

This comprehensive analysis was directed by the principal objective of evaluating the role, current status, and potential of integrating Ayurveda and Yoga into India's healthcare system for the prevention and management of NCDs. The specific research questions, formulated to ensure a thorough and targeted investigation, are as follows:

1. What are the foundational principles of Ayurveda and Yoga that are pertinent to the prevention of Non-Communicable Diseases (NCDs) and the promotion of overall health and well-being?

2. Evidence of Intervention Efficacy: What is the extent of existing evidence supporting the role of Ayurvedic and Yogic interventions in the prevention and management of specific NCDs, namely cardiovascular diseases, diabetes mellitus, cancers, and chronic respiratory diseases?

3.Synergistic Approach of Integrated Systems: How do the integrated approaches of Ayurveda and Yoga provide a comprehensive and synergistic framework for addressing Non-Communicable Diseases, moving beyond symptomatic relief to holistic metabolic and physiological restoration?

3.2 Research Design

The study utilized a descriptive and analytical research design, manifesting as a comprehensive literature review and critical policy analysis. This particular design was deemed most appropriate given the study's objective: to synthesize extant knowledge from a wide array of sources, evaluate the complexities of current practices and policies, and identify prevailing challenges and opportunities concerning the integration of Ayurveda and Yoga for NCD management in India. Such a design is particularly useful for exploring multifaceted phenomena where primary empirical data collection on the entire scope might be impractical or less illuminating than a thorough synthesis of existing work. The methodology involved a systematic process of identifying, appraising, and interpreting existing data and published literature, rather than primary data collection. This approach facilitates a holistic understanding by drawing together information from diverse scholarly, governmental, and institutional domains, allowing for a multi-dimensional view of the integration landscape. The interpretative aspect of the design involves not just summarization but also critical assessment of the quality and relevance of the information, and the synthesis of disparate findings into a coherent analytical narrative.

3.3 Study Setting

The geographical and contextual locus of this analysis is exclusively India. This focus is critical due to India's unique healthcare milieu, characterized by the officially recognized coexistence and attempted integration of traditional systems of medicine (like Ayurveda and Yoga) alongside modern allopathic medicine. Furthermore, India faces a substantial and rapidly growing NCD burden, prompting concerted governmental efforts to explore and implement integrative health strategies. The nation's proactive policy stance on AYUSH systems further underscores the relevance of this specific setting for an in-depth analysis of NCD management through integrated approaches.

3.4 Study Objectives

- To explore the perceived benefits and challenges of adopting Ayurvedic and Yogic interventions from the perspectives of healthcare professionals and patients
- Evaluate the current level of integration of Ayurveda and Yoga in the existing government healthcare framework for NCD management.
- To provide evidence based recommendations for strengthening the integration of Ayurveda and Yoga into India's national health system for enhanced NCD control.

3.5 Literature and Data Sources

The literature reviewed for this research is the extensive body of literature and diverse informational sources subjected to examination. The integrity and comprehensiveness of this analysis hinge on the quality and breadth of these secondary sources. Data were meticulously and systematically drawn from a wide spectrum of such sources, categorized as follows:

- Peer-reviewed Academic Journals: These served as a primary source for scientific evidence, including epidemiological data on NCDs, findings from clinical studies (such as Randomized Controlled Trials, observational studies, and systematic reviews) evaluating Ayurvedic and Yogic interventions for various NCDs.

- Government Publications and Policy Documents: Official reports, policy pronouncements, and programmatic guidelines from key governmental bodies such as the Ministry of Health and Family Welfare (MoH&FW), the Ministry of AYUSH, and NITI Aayog were crucial. This included documents like the National Health Policy (NHP) 2017, the National AYUSH Mission (NAM) framework, and operational details of the National Programme for Prevention and Control of Cancer, Diabetes, Cardiovascular Diseases and Stroke (NP-NCD). These sources provided insights into the policy landscape, strategic planning, and reported outcomes of integration initiatives.

- Reports from National and International Health Organizations: Publications and databases from authoritative entities such as the World Health Organization (WHO), the Indian Council of Medical Research (ICMR), and the Central Council for Research in Ayurvedic Sciences (CCRAS) offered broader public health perspectives, research priorities, and data on NCD trends and traditional medicine utilization.
- Institutional Reports and Websites: Information disseminated by academic and healthcare institutions actively engaged in integrative medicine research, education, and clinical practice, for instance, the All India Institute of Ayurveda (AIIA) and the Tata Memorial Centre (TMC), provided specific examples of integrated models and research findings.

The analysis encompassed information relating to the NCD burden, the philosophical and practical tenets of Ayurveda and Yoga, their specific applications in NCD prevention and management, current integration efforts and their effectiveness, prevailing policy frameworks, documented implementation challenges and opportunities, and stakeholder perspectives (including those of healthcare providers and patients) as documented in the available literature. It is reiterated that this study did not entail direct sampling from human populations or the prospective calculation of sample sizes, as it is founded on secondary data analysis.

3.5 Research Procedures/Approaches

The research was predominantly executed through a qualitative assessment and rigorous synthesis of existing information, employing a multi-stage process:

1. Literature Identification and Scoping: A comprehensive and iterative search strategy was implicitly employed to identify relevant documents and publications from the sources delineated in Section 3.4 and the extensive bibliography of the primary document. This involved scanning databases, institutional repositories, and governmental archives using keywords related to NCDs, Ayurveda, Yoga, healthcare integration, health policy, and

India. The breadth of citations throughout the source document attests to a thorough information-gathering process designed to capture a wide range of relevant materials.

2. Information Extraction and Thematic Organization: Salient information pertinent to each research question was systematically extracted from the sourced documents. This process involved careful reading and annotation to identify key data points, findings, arguments, and policy details. The extracted information was then organized thematically (e.g., NCD burden, Ayurvedic principles, Yogic practices, specific disease interventions, policy measures, stakeholder views, challenges) to structure the subsequent analysis and the narrative of the report. This thematic structuring facilitated a coherent review of complex and diverse information.

3. Critical Analysis and Synthesis (Qualitative Methods): The amassed and organized information was subjected to critical analysis. This extended beyond mere summarization to involve an interpretive process of discerning patterns, emergent themes, areas of convergence or divergence in findings, and identifying significant gaps within the existing body of knowledge and practice. The analysis involved:

    - A descriptive account of the NCD burden in India and a critical examination of the rationale for pursuing integrative healthcare approaches, drawing upon epidemiological and health system data.
    - A summarization and interpretation of the theoretical underpinnings and practical applications of Ayurveda and Yoga in the context of NCDs, based on classical texts and contemporary research.
    - An evaluation of the existing evidence base for disease-specific interventions, considering the types of studies available (e.g., RCTs, observational studies) and the reported efficacy and safety.

- An assessment of the current status of integration efforts and policy effectiveness, based on government reports, program evaluations, and scholarly analyses.
- An interpretation of stakeholder perspectives (healthcare providers, patients, policymakers) and the identification of implementation challenges and opportunities as documented in the literature, highlighting both facilitators and barriers to effective integration.

4. Development of Evidence-Based Recommendations: Predicated on the comprehensive synthesis and critical analysis of the gathered evidence, identified challenges, and noted opportunities, a set of evidence-based recommendations was formulated. These recommendations were designed to be actionable and targeted at strengthening the integration of Ayurveda and Yoga within NCD prevention and management strategies in India.

No primary quantitative data (e.g., through surveys or experiments with new study instruments) were collated for this particular analysis, nor were primary statistical methods (beyond reporting statistics from cited studies) employed by the authors of this report for novel data analysis. The analytical strength of this report derives from its qualitative interpretation and synthesis of a broad range of existing quantitative (e.g., prevalence rates from national surveys, clinical trial outcomes) and qualitative data (e.g., stakeholder perceptions from qualitative studies, policy analyses).

3.6 Operational Definitions

Key terms employed throughout this analysis are defined by their contextual application within the primary document, ensuring clarity and consistency:

- Non-Communicable Diseases (NCDs): These pertain to a category of persistent medical disorders that typically last for an extended period and arise from a mixture of genetic, physiological, environmental, and behavioral influences. As addressed in this report, they primarily include cardiovascular diseases (such as heart disease and stroke), diabetes

mellitus, various forms of cancer, and chronic respiratory illnesses (like asthma and COPD). Their non-infectious nature and significant contribution to morbidity and mortality in India are central to this study.

- Ayurveda: As conceptualized in this report, Ayurveda is one of the world's oldest traditional systems of medicine, originating in India. It offers a holistic paradigm for health and wellness, emphasizing the balance of the body's three fundamental biological energies or humors (doshas: Vata, Pitta, and Kapha). Key practices include structured lifestyle regimens such as Dinacharya (daily routines) and Ritucharya (seasonal routines), specific dietary principles (Ahara), purification and detoxification procedures (Panchakarma), and the therapeutic use of specific herbs and polyherbal formulations.
- Yoga: Within the scope of this analysis, Yoga is presented as a comprehensive and ancient Indian discipline focused on achieving harmony between mind and body for overall well-being and spiritual development This encompasses a variety of practices, which include ethical principles for individual and societal behavior (Yamas and Niyamas), a collection of physical positions or exercises (Asanas) aimed at enhancing strength, flexibility, and organ functionality, controlled breathing methods (Pranayama) intended to improve respiratory capacity and physiological equilibrium, as well as diverse meditative techniques (Dhyana) focused on fostering mental tranquility, concentration, and self-awareness.
- Integration (Healthcare): In the framework of this report, healthcare integration is defined as the intentional and systematic approach to incorporating AYUSH systems (Ayurveda, Yoga & Naturopathy, Unani, Siddha, and Homoeopathy), with a specific emphasis on Ayurveda and Yoga, into the conventional healthcare delivery system in India. This includes a variety of strategies, such as the co-location of AYUSH facilities within standard Primary Health Centres (PHCs), Community Health Centres (CHCs), and District Hospitals (DHs), the creation of specialized integrated AYUSH departments in central

government hospitals, and the integration of AYUSH elements and interventions into national health initiatives like the NP-NCD. The primary aim is to deliver comprehensive, accessible, and patient-centered care by utilizing the strengths of diverse medical systems.

- Preventative Approaches: As discussed herein, preventative approaches are strategies and interventions primarily aimed at averting the onset of NCDs and promoting overall health and well-being in the population. These focus significantly on comprehensive lifestyle modifications, effective management and reduction of known risk factors (such as unhealthy diet, physical inactivity, tobacco use, and stress), and active health promotion through education and community engagement. Ayurveda (with its emphasis on Dinacharya, Ritucharya, and balanced Ahara) and Yoga (through its stress-reducing and health-enhancing practices) are presented as potent systems for NCD prevention.
- Curative Approaches: Within this analysis, curative approaches refer to interventions and therapeutic modalities directed towards the management, treatment, and alleviation of symptoms of existing NCDs, as well as improving the quality of life for individuals affected by these conditions. In this context, Ayurvedic practices (such as Panchakarma for systemic detoxification, Rasayana therapies for rejuvenation, and specific herbal formulations targeted at disease processes) and Yogic therapies (including tailored Asanas, Pranayama, and meditation for specific conditions) are explored for their therapeutic efficacy, frequently positioned as valuable complementary modalities to conventional allopathic medical treatments.

3.7 Hypothesis/Research Proposition

This report does not formulate or test a formal statistical hypothesis in the traditional empirical sense (e.g., $H_0: \mu_1 = \mu_2$). Instead, its central premise operates as a research proposition or analytical thesis: that the strategic and evidence-informed integration of Ayurveda and Yoga into India's mainstream healthcare system offers a substantive, holistic, culturally congruent, and potentially

cost-effective approach to significantly mitigate the escalating NCD epidemic. The comprehensive analysis undertaken in this report seeks to critically evaluate this proposition by systematically examining the existing body of evidence, analyzing current policy frameworks and their implementation, and considering the documented experiences and perspectives of key stakeholders. The study aims to determine the validity and practical implications of this proposition rather than to statistically test a predefined hypothesis.

3.8 Ethical Considerations

This study constitutes a comprehensive secondary analysis predicated upon pre-existing, published, and publicly accessible data and literature. Consequently, no direct research involving human subjects, such as primary data collection through interviews, surveys, or clinical interventions, was undertaken by the authors of this specific report. The ethical conduct of this review was governed by the following considerations:

- **Accurate and Unbiased Representation**: Diligent efforts were made throughout the research process to ensure the accurate, objective, and unbiased representation of findings, arguments, and perspectives extracted from the sourced documents. Care was taken to avoid misinterpretation or selective reporting that could distort the original authors' intent or the available evidence.
- Proper Attribution and Academic Integrity: All information, data, and conceptual frameworks derived from external sources have been scrupulously cited throughout the document. This adheres to the principles of academic integrity by appropriately acknowledging the intellectual contributions of the original authors, studies, and reports.
- Reliance on Ethically Conducted Primary Research: The analysis is contingent upon data and findings from primary studies (e.g., clinical trials, epidemiological surveys, qualitative research involving human participants) that were cited. It is presumed that these original studies secured the necessary ethical approvals from relevant institutional review boards

or ethics committees and obtained informed consent from participants (including provisions for informed written consent and ensuring voluntary participation, data security, and confidentiality) as per established ethical guidelines for research involving human subjects. This review did not involve any new data collection activities that would necessitate separate ethical review or consent procedures.

- Data Security and Confidentiality (Secondary Data Context): Given that no primary data containing personal identifiers were collected, accessed, or managed for this specific report, considerations of participant data security and confidentiality are primarily addressed by relying on aggregated, anonymized, or publicly available data as presented in the source materials. The ethical responsibility in this regard involves respecting the level of anonymity or de-identification provided in the original publications.
- Scholarly Responsibility in Synthesis: The synthesis of information itself was approached with a sense of scholarly responsibility, aiming to provide a balanced and comprehensive overview of the topic, acknowledging complexities, and highlighting areas where evidence may be limited or conflicting, thereby contributing constructively to the understanding of AYUSH integration for NCD management.

By adhering to these principles, this analysis aims to provide a credible and ethically sound contribution to the discourse on integrating Ayurveda and Yoga into NCD management in India.

RESULTS

V. Integration of Ayurveda and Yoga within India's Healthcare Framework

A. Current Level of Integration

India has achieved considerable progress in incorporating Ayurveda and Yoga into its primary healthcare framework, especially concerning the prevention and management of non-communicable diseases (NCDs). This integration signifies a purposeful strategy to utilize traditional medicine in conjunction with conventional methods.

- **Integration within Existing Government Healthcare Facilities and Initiatives**: The Ministry of AYUSH, in collaboration with the Ministry of Health and Family Welfare (MoH&FW), has established Integrated AYUSH Departments in Central Government Hospitals, demonstrating a dedication to integrative healthcare.[35] A fundamental strategy entails the co-location of AYUSH facilities within Primary Health Centres (PHCs), Community Health Centres (CHCs), and District Hospitals (DHs). This method seeks to offer patients a selection of various medical systems through a unified access point, thereby improving accessibility and promoting patient-centered care.[35]
    - The All India Institute of Ayurveda (AIIA) located in New Delhi exemplifies this integration effectively. It offers specialized Ayurvedic treatment for a range of non-communicable diseases (NCDs), such as Diabetes, Hypertension, Obesity, and stress-related conditions, utilizing a blend of Panchakarma therapies, Ayurvedic medications, tailored dietary recommendations, and yoga therapy.[37] AIIA operates specialized Outpatient Departments (OPDs) dedicated to Cancer, Diabetes, and metabolic disorders, which have reportedly provided assistance to around 5,500 cancer patients and 45,000 individuals suffering from diabetes and metabolic disorders up to this point.

- AIIA operates specialized Outpatient Departments (OPDs) dedicated to Cancer, Diabetes, and metabolic disorders, which have reportedly provided assistance to around 5,500 cancer patients and 45,000 individuals suffering from diabetes and metabolic disorders up to this point.[37]
- The Central Council for Research in Ayurvedic Sciences (CCRAS) is instrumental in producing scientific evidence regarding the safety and effectiveness of Ayurvedic formulations for non-communicable diseases (NCDs). Some of the drugs developed by CCRAS have even been commercialized.[37] CCRAS has also conducted feasibility studies on integrating Ayurveda with modern medicine, such as a study on the management of Osteoarthritis at Safdarjung Hospital in New Delhi.[35]
- Further institutional advancement encompasses the Central Research Institute of Yoga & Naturopathy (CRIYN) located in Dibrugarh, which is being established as a Centre of Excellence for Cardiovascular Diseases (CVD). Its objective is to develop evidence-based protocols for NCD management that can be integrated with conventional care, reinforcing the integrated medicine approach.[39] CRIYN will also offer clinical training facilities in areas like cardiac rehabilitation, diabetes rehabilitation, and NCD risk reduction.[39]
- The Department of Integrative Medicine at Sri Devaraj Urs Academy of Higher Education and Research (SDUAHER) in Kolar exemplifies academic and clinical integration. It offers Yoga therapy, Ayurveda, and counseling services, with a mission to develop evidence-based integrated holistic healthcare modules for NCDs.[40]

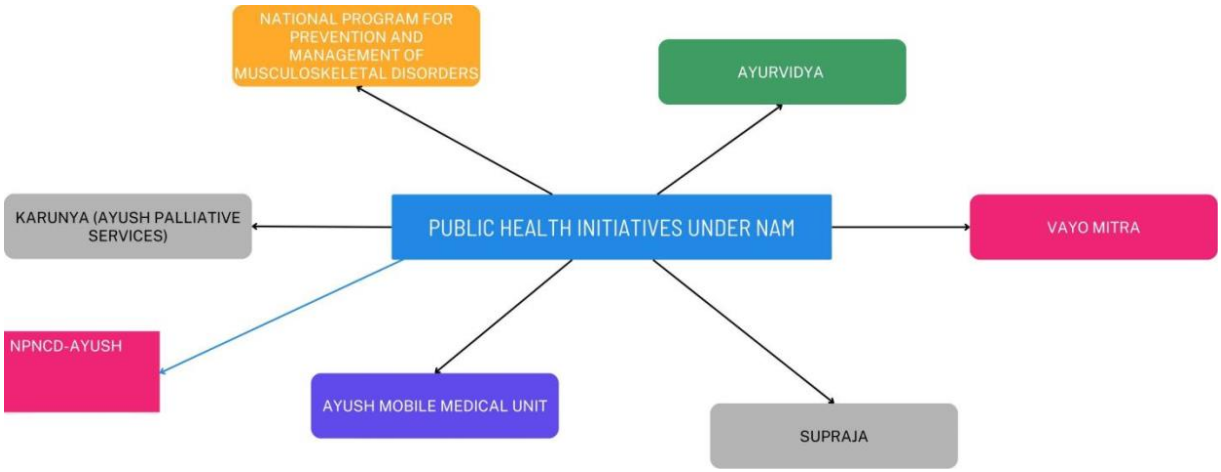

Figure 1 : Initiatives under National Ayush Mission. NAM: National Ayush Mission

The institutionalization of pluralism is a significant development in India's healthcare landscape. The clear governmental strategy to move beyond mere acceptance of AYUSH to active integration within the mainstream healthcare system is evident. This is demonstrated by the co-location of AYUSH facilities within PHCs, CHCs, and DHs [35], the establishment of dedicated AYUSH departments in central hospitals [35], and specialized institutes like AIIA and CRIYN focusing on NCDs.[37] This indicates a systemic effort to institutionalize medical pluralism, providing patients with a choice of systems under one roof. This institutionalization is crucial for scaling up integrated NCD care and making it accessible to a wider population, moving from pilot projects to a more embedded approach within the national healthcare framework.

B. Policy-Level Implementations and their Effectiveness

India's policy framework strongly endorses the incorporation of traditional medical systems, especially Ayurveda and Yoga, into national health initiatives aimed at the prevention and management of non-communicable diseases (NCDs)..

- **National Health Policy (NHP 2017**): This policy promotes the integration of AYUSH through a principle referred to as "Pluralism," aligning with the World Health

Organization's (WHO) Sustainable Development Goal (SDG) 3 and the worldwide priorities for traditional medicine.[6] It champions a holistic healthcare approach and aims to ensure access to AYUSH care providers, thereby leveraging these systems to achieve national health goals.[6]

- **National AYUSH Mission (NAM)**: Launched in 2014 and revised in 2021–22, NAM incorporates eight AYUSH public health programs.[6] Its objectives include providing cost-effective and equitable AYUSH services, strengthening educational systems, ensuring quality control of drugs, and promoting sustainable raw material availability.[36] Flexible components under NAM include AYUSH Wellness Centres (which encompass Yoga & Naturopathy), Tele-medicine services, and School Health Programs through AYUSH, all contributing to NCD management.[36]
- **National Programme for Prevention And Control ofNon Communicable Diseases (NP-NCD):** This integrated program is a cornerstone of India's NCD strategy. Initially piloted in 10 districts, it has since been scaled up to cover all districts across the country.[43] A key component of NP-NCD is the integration of AYUSH (specifically Ayurveda) in selected districts.[6]
    - Effectiveness: The NP-NCD-AYUSH integration initiative has yielded concrete positive outcomes. It exhibited notable decreases in both fasting and postprandial blood glucose levels among prediabetic and type 2 diabetic individuals when Ayurvedic treatment was incorporated alongside lifestyle changes and Yoga.[7] Subjective symptoms including polyuria, polydipsia, polyphagia, blurred vision, and weakness showed improvement in all intervention groups.[7]
    - Scale of Implementation: Between 2019 and 2020, this initiative was executed across three districts—Surendra Nagar (Gujarat), Bhilwada (Rajasthan), and Gaya (Bihar). Throughout this period, 14,773 patients were registered for non-

communicable diseases (NCDs), and an impressive total of 329,565 patients were enrolled in Yoga Classes, with 2,784 camps organized as part of the program.[47]

- **Collaborations**:
    - The Ministry of AYUSH, in conjunction with the Council of Scientific and Industrial Research (CSIR), maintains a formal Memorandum of Understanding (MoU) aimed at promoting research and development in traditional systems as well as interdisciplinary sciences, thereby enhancing scientific collaboration..[37]
    - The AIIA and the CSIR-Institute of Genomics and Integrative Biology (IGIB) engage in collaborative research in genomic biology, which encompasses an Ayurgenomics methodology for addressing Madhumeha (Diabetes Mellitus).[37]
    - The Indian Council of Medical Research (ICMR) and the Central Council for Research in Ayurvedic Sciences (CCRAS) have collaboratively established the Ayush-ICMR Advanced Centre for Integrative Health Research (AI-ACIHR) at the All India Institute of Medical Sciences (AIIMS). This center aims to conduct research in integrative healthcare, with specialized units focusing on gastro-intestinal disorders, women and child health, geriatric health, and cancer care across various AIIMS institutions.[35]

The contrast between policy intent and implementation reality is a critical observation. While government documents clearly articulate a strong policy intent for AYUSH integration, promoting "Pluralism" and establishing national missions (NAM) and integration projects (NP-NCD-AYUSH) [6], the broad policy documents also reveal significant implementation challenges. These challenges span across all six building blocks of health systems: poor functioning of NCD cells, workforce shortages, lack of diagnostics and essential medicines, low budget utilization, and poor multisectoral coordination.[18] This highlights a critical gap between ambitious policy formulation and on-the-ground execution. The effectiveness of these policies is often constrained by systemic

weaknesses within the broader healthcare infrastructure. This implies that future strategies must focus not just on designing policies for integration but on strengthening the foundational health system elements and ensuring robust monitoring, accountability, and resource allocation to translate policy intent into tangible, widespread health outcomes.

Table 11: Key Government Policies and Initiatives for AYUSH Integration in NCDs

Policy/Initiative	Key Objectives/Components	Impact/Status
National Health Policy (NHP) 2017	Advocates for "Pluralism" and a comprehensive healthcare strategy; guarantees accessibility to AYUSH healthcare practitioners to fulfill national health objectives.[6]	Aligns with the World Health Organization's Sustainable Development Goal 3 and the global priorities for traditional medicine; establishes a strategic framework for the integration of AYUSH.[6]
National AYUSH Mission (NAM)	Initiated in 2014 and updated in 2021-22; includes eight public health initiatives under AYUSH. Aims for cost-effective, equitable AYUSH services; strengthens education; ensures quality control of drugs and raw materials.[6] Flexible components include AYUSH Wellness Centres (Yoga & Naturopathy), Tele-medicine, School Health Programs.[36]	Demonstrates practical application in health promotion and NCD management.[6] Supports co-location of AYUSH facilities at PHCs, CHCs, DHs.[35]
National Programme for Prevention and Control of Cancer, Diabetes, CVD and Stroke (NP-NCD)	Primary integrated program, scaled up to all districts. Integrates AYUSH (Ayurveda) in selected districts.[6]	NP-NCD-AYUSH integration project showed significant reductions in blood sugar levels for prediabetic and type 2 diabetic patients with Ayurveda and Yoga.[7] Enrolled 14,773 NCD patients and 329,565 for Yoga classes in 3 districts (2019-2020).[47]

Policy/Initiative	Key Objectives/Components	Impact/Status
Ayurswasthya Yojana	Central Sector Scheme (FY 2021-22) with "Ayush and Public Health" and "Centre of Excellence" components. Promotes AYUSH interventions for community healthcare, demonstrates advantages in public health, supports SDGs.[37]	Supported 11 projects in various states on lifestyle disorders (Diabetes, Hypertension, Obesity, Osteoporosis, etc.) through Ayurvedic interventions.[37]
AYUSH-ICMR Advanced Centre for Integrative Health Research (AI-ACIHR)	Joint initiative at AIIMS to conduct research on integrative healthcare. Focus areas: gastro-intestinal disorders, women and child health, geriatric health, cancer care.[35]	Establishes dedicated research centers for evidence-based integrative approaches in critical NCD areas.[35]
Collaborations (e.g., Ministry of AYUSH-CSIR)	MoU for R&D in traditional systems and interdisciplinary sciences; faculty/student exchange; resource sharing; traditional knowledge protection.[37] AIIA and CSIR-IGIB collaborate on genomic biology research (e.g., Ayurgenomics for Madhumeha).[37]	Fosters scientific validation and integration of traditional knowledge with modern science.[37]

C. Challenges and Opportunities in Integration

Despite the strong policy intent and promising pilot projects, the integration of Ayurveda and Yoga into India's NCD prevention and management framework faces significant challenges. These challenges are often systemic, reflecting broader weaknesses in the healthcare system, but they also present opportunities for strategic intervention.

- **Implementation Challenges (based on WHO's six building blocks of health systems):**
    - **Health Service Delivery**: The functioning of district-level NCD cells remains poor, hindering effective program implementation.[43] There is a persistent lack of access to diagnostics and a regular supply of essential medicines, which compromises continuity of care.[18] Population-based NCD screening, a crucial preventive measure, is poorly functional, with significant challenges in referral and tracking systems, leading to a high loss of suspected cases to follow-up.[43]
    - **Health Workforce**: A critical shortage of trained human resources for NCD screening is observed.[18] The health workforce is often contractual, and adequate training under NP-NCD remains an issue.[18] State Nodal Officers frequently have additional charges, diverting their focus from NCD programs.[43] Primary Health Centre (PHC) doctors are infrequently trained in NCD management, further exacerbating the problem.[18]
    - **Health Information Systems**: The NP-NCD Management Information System is not yet fully in place, indicating a need for a comprehensive NCD database to support evidence-based local responses.[43] Inconsistency in data collection and reporting is prevalent due to inadequate health information systems.[43]
    - **Access to Essential Medicines**: Irregular supply of drugs and consumables in NCD clinics is a persistent problem, leading to patient reliance on private chemists and increased out-of-pocket expenditure.[18]

- **Financing**: There is a low central budget allocation for NCD programs, coupled with under-utilization of allocated budgets in many states.[18] A poor focus on health promotion, with a low allocated budget for Information, Education, and Communication (IEC) activities, further limits preventive efforts.[18]
- **Leadership/Governance**: There is a poor focus on health promotion, multisectoral participation, surveillance, monitoring, and evaluation of the program at different levels of healthcare delivery.[18] A lack of coordination among different sectors, with non-health departments often lacking ownership and understanding of their role in NCD prevention, significantly impedes program success.[18]
- **Challenges in Standardizing Ayurvedic Interventions and Proving Effectiveness**: A lack of standardization in herbal formulations and dosages leads to variability in potency and effectiveness.[28] There is a need for further rigorous clinical validation through large-scale trials to establish the efficacy of Ayurvedic and Yogic interventions.[2] Limited awareness among modern physicians, minimal interaction between practitioners, lack of standardized protocols, and insufficient research on AYUSH's synergistic effects pose significant barriers to integration.[6] Additionally, a scarcity of well-conducted studies and limited openness of leading journals to publish traditional medicine research restrict the available evidence base.[6]

- **Opportunities**:
  - **Task Shifting**: Training mid-level healthcare providers and AYUSH practitioners to take on NCD care tasks presents a significant opportunity to address workforce shortages and improve accessibility of care.[18] Pilot projects are already exploring the integration of AYUSH knowledge for NCD prevention and control through health promotion and cost-effective AYUSH solutions.[18]

- **eHealth/mHealth**: The widening use of electronic health (eHealth) and mobile health (mHealth) tools offers a powerful avenue for health education, self-management, and improving treatment adherence (e.g., mCessation for tobacco cessation, mDiabetes for diabetes prevention).[18] These technologies can also facilitate remote monitoring and clinical diagnosis support and can be integrated with big data and machine learning for enhanced health insights.[18]
- **Public-Private Partnerships (PPP)**: Leveraging the strengths of both public and private sectors through PPPs can help overcome shortcomings in service delivery and address inequalities in health service distribution, bringing meaningful contributions from private and non-governmental organizations.[4]
- **Community Engagement**: Participatory health governance through active community engagement has been shown to improve accountability, quality of services, and health-seeking behavior.[18] Civil society organizations (CSOs) can also play a vital role in improving awareness and health-seeking behavior within communities.[18]

The paradox of policy and practice in bridging the implementation gap is evident. While policies are progressive and visionary in promoting AYUSH integration, the actual implementation faces systemic hurdles.[18] This represents a classic "implementation gap" where the intent is strong but the capacity, resources, and coordination mechanisms are insufficient. The challenges identified, such as workforce shortages, financing issues, and data inconsistencies, are not unique to AYUSH integration but reflect broader weaknesses in the Indian health system. The opportunities identified, including task shifting, eHealth, PPPs, and community engagement, are essentially strategies to bridge this gap, leveraging existing strengths and new technologies to overcome systemic limitations. This suggests that successful integration of AYUSH into NCD management in India hinges less on policy formulation (which is largely in place) and more on robust health

system strengthening, particularly at the primary care level, and fostering genuine inter-sectoral collaboration and resource optimization.

Table 12: Implementation Challenges and Opportunities for AYUSH Integration in NCD Programs

Category	Challenges/Barriers	Opportunities/Solutions
Health Service Delivery	Poor functioning of district-level NCD cells.[43] Lack of access to diagnostics and regular supply of essential medicines.[18] Poorly functional population-based NCD screening with high loss to follow-up.[43]	Co-location of AYUSH facilities at PHCs, CHCs, DHs to improve accessibility and choice.[35] Strengthening referral systems.[43]
Health Workforce	Shortage of trained human resources for NCD screening.[18] Inadequate training under NP-NCD.[18] PHC doctors infrequently trained in NCD management.[18]	Task shifting: training mid-level healthcare providers and AYUSH practitioners for NCD care.[18] Developing interdisciplinary curricula.[6]
Health Information Systems	NP-NCD Management Information System not fully in place.[43] Need for comprehensive NCD database.[43] Inconsistency in data.[43]	Leveraging eHealth and mHealth tools for robust surveillance and data collection.[18] Integration with big data/ML.[18]
Access to Essential Medicines	Irregular supply of drugs and consumables in NCD clinics.[18]	Addressing regulatory barriers for Ayurvedic medicines.[10] Ensuring consistent supply chains.[43]
Financing	Low central budget allocation for NCD programs.[18] Under-utilization of budget in many states.[18] Poor focus on health	Increased financial allocation and optimal utilization of funds.[43] Public-Private Partnerships

	promotion with low allocated budget.[18] High out-of-pocket expenditure.[18]	(PPP) for resource mobilization.[4]
Leadership/Governance	Poor focus on health promotion, multisectoral participation, surveillance, monitoring, evaluation.[18] Lack of coordination, non-health departments lacking ownership.[18]	Enhance multisectoral participation and ownership.[43] Strengthen monitoring and evaluation systems.[43]
Research & Standardization	Lack of standardization in herbal formulations/dosages.[28] Need for large-scale clinical validation.[2] Limited awareness/interaction among physicians.[6] Insufficient research on synergistic effects.[6]	Promote large-scale RCTs.[2] Develop standardized treatment protocols/SOPs.[6] Conduct research on synergistic interactions.[6]

VI. Perceptions and Experiences of Stakeholders Regarding Integrated Ayurveda and Yoga

Understanding the perspectives of healthcare providers and the community is crucial for effective integration of Ayurveda and Yoga into NCD management. These perceptions highlight both the strengths and challenges of current integration efforts.

A. Healthcare Providers

Healthcare professionals exhibit varied attitudes towards AYUSH integration, often influenced by their experience and training. While some medical professionals acknowledge the importance of interventions like pulmonary rehabilitation (PR) for Chronic Respiratory Diseases (CRDs), their knowledge of specific traditional practices like yoga may be limited, and they may not consistently refer patients for such therapies.[34] There is a general consensus among medical professionals that PR holds equal importance to pharmacological treatment for CRDs, underscoring its necessity.[34] Ayurvedic practitioners, on the other hand, often emphasize that Ayurveda's philosophy of treating the root cause of disease differs significantly from conventional Western medicine, which tends to focus on symptom management. They view Ayurveda as a gentler system that encourages the body's innate healing capabilities.[10]

Despite the potential, healthcare providers, particularly those in modern medicine, face several challenges regarding AYUSH integration:

- **Awareness Gap**: A significant barrier is the lack of awareness or inadequate information among modern medicine physicians about AYUSH systems and their practices.[6] This knowledge deficit hinders their ability to confidently recommend or integrate AYUSH therapies.

- **Lack of Interaction**: Practitioners from both modern and traditional systems often operate independently, resulting in minimal interaction and collaboration in clinical decision-making. This siloed approach prevents optimal utilization of the strengths offered by traditional medicine.[6]
- **Limited Standardized Protocols**: Insufficient research and a lack of standardized integrative treatment protocols impede informed healthcare choices and broader adoption of integrated approaches.[6]
- **Lack of Access to Ayurvedic Medicines**: Ayurvedic practitioners themselves face challenges with limited access to certain Ayurvedic medicines due to highly regulated import, production, and distribution frameworks, which can restrict their practice.[10]
- **Restrictions in Practice and Lack of Regulation**: Concerns exist among practitioners that a lack of adequate regulation allows untrained individuals to establish clinics, potentially leading to substandard treatments. This prompts the calls for mandatory licensing, certification, and accreditation for qualified practitioners to ensure quality care.[10]
- **Improving the Ayurvedic Research Evidence Base**: While some practitioners emphasize the need for rigorous scientific research, including validation, standardization of treatments, and robust clinical trials, to support Ayurveda's acceptance, others believe its historical success is sufficient.[10] This divergence in views can impact the drive for evidence generation.

The professional divide and its impact on integration are profound. The documented "awareness gap" and "lack of interaction" between modern medicine physicians and AYUSH practitioners [6] represent a critical barrier to effective integration. This divide prevents mutual understanding, trust, and the development of truly collaborative care models. The differing philosophical foundations, where one system focuses on root cause treatment and the other on symptom management [10], further complicate this interaction. Without a shared understanding and established

protocols, integration remains fragmented, relying more on individual initiative rather than systemic collaboration. Overcoming this requires targeted interdisciplinary education, structured platforms for interaction (such as the NIMHANS model where practitioners from different systems discuss patient care), and robust research to build a common evidence base that can foster professional confidence in integrated approaches.

B. Community/Patients

Patients' experiences and perceptions of AYUSH treatment and Yoga for NCD management are largely positive, driving their acceptance and willingness to adopt these modalities.

- **Perceived Benefits of AYUSH Treatment and Yoga**:
    - **Symptom Relief**: Patients consistently report varying degrees of symptom relief after using Ayurvedic treatments, including the cessation of muscle pains, disappearance of eczema, alleviation of stomach pain, improved sleep, and clearer thoughts.[10] For NCDs specifically, a study found that patients experienced significant benefits from AYUSH and Yoga, including relief from pain (82%), improved appetite (72%), reduced weakness (72%), reduced sickness (71%), improved sleep (70%), and reduced tension/anxiety (61%).[8] Patients also reported reductions in weight, blood pressure, and sugar levels, and relief from asthma, joint pain, backache, migraine, gas problems, and depression, leading to a considerable improvement in their quality of life.[8]
    - **Overall Health Improvement**: More than 85% of patients reported improvement in their health conditions to some extent or a great extent after undergoing AYUSH and Yoga treatment.[8]
    - **Reduced Allopathic Medicine Usage**: A significant impact on conventional medicine usage was observed: 73% of patients reduced their allopathic medicine dosage, 52% experienced reduced side effects from allopathic medicines, and 24%

completely stopped taking allopathic medicine after starting AYUSH treatment.[8] Many patients with high blood pressure reported normalization of their BP and a shift to AYUSH medicines.[8]

- **Reasons for Acceptance**:
    - **Low Cost**: AYUSH medicine is widely perceived as a low-cost alternative compared to allopathic medicines.[8]
    - **Fewer Side Effects**: A major driver of acceptance is the perception that AYUSH medicines have fewer side effects compared to conventional Western treatments.[8]
    - **Effectiveness and Long-lasting Effects**: Patients hold a positive opinion about the effectiveness of AYUSH medicines combined with yoga treatment, often preferring it over allopathic treatment for NCDs due to its perceived efficacy in prevention and management, and its contribution to long-lasting lifestyle changes.[8]
    - **Holistic/Natural Approach**: Patients value Ayurveda as a gentler, more natural, and holistic alternative that addresses the whole person rather than just symptoms.[10]
- **Challenges in Adopting Ayurvedic Regimens**:
    - **Lifestyle Changes and Adherence**: While comprehensive, Ayurvedic treatment plans involving dietary and lifestyle changes are often found challenging to sustain in modern, fast-paced lifestyles due to the significant changes and strict adherence required.[10]
    - **Patience Required**: Patients note that Ayurvedic treatments often take longer to produce results, necessitating patience and persistence, which can be a barrier for some.[10]

- **Cost**: Despite being generally lower cost, the absolute cost of Ayurvedic treatments can still be a concern for some patients, particularly when not covered by health insurance.[10]
- **Lack of Support**: Patients report difficulties in gaining support from family members, friends, and the broader medical community, especially in regions where Ayurveda is not well-recognized or culturally accepted.[10]
- **Informal Learning of Yoga**: Many patients learn yoga postures and breathing exercises from informal sources like friends, family, televised programs, or YouTube videos, rather than from trained professionals, which may affect proper technique and optimal benefits.[34]
- **Patient Preference for Alternative Systems**: This preference is identified as a key barrier to adherence to conventional medication in India, suggesting that patients may choose one system over another rather than integrating them.[51]

The paradox of patient acceptance and adherence barriers is a significant observation. There is strong and widespread positive perception and acceptance of AYUSH and Yoga among patients, driven by perceived benefits such as symptom relief, reduced side effects, effectiveness, and low cost, as well as a desire for lifestyle-driven, long-term solutions.[8] This high level of acceptance presents a major opportunity for integration. However, paradoxically, patients also face significant adherence challenges related to the demanding nature of lifestyle changes, the time required for results, and the need for financial and social support.[10] This indicates that while the philosophy and perceived benefits of AYUSH are highly accepted, the practical implementation of these holistic regimens in modern life presents real-world barriers. The preference for alternative systems also acts as a barrier to adherence to conventional medicine [51], suggesting a potential for patients to choose one system over another rather than integrating them. Successful integration models must not only promote the benefits of AYUSH but also actively address these adherence

barriers through patient education, practical support for lifestyle changes, ensuring financial accessibility, and fostering a collaborative environment where patients feel supported in combining different modalities rather than choosing one over the other.

Table 13: Perceived Benefits and Challenges of AYUSH Integration from Stakeholder Perspectives

Stakeholder Group	Perceived Benefits	Challenges/Barriers
Healthcare Providers	Ayurvedic Practitioners: Focus on treating root cause.[10] Holistic nature of Ayurveda.[10] Strength in long-term management of chronic conditions.[10] Individualized treatment plans.[10] Modern Medicine Physicians: PR plays equal role to pharmacological treatment for CRDs.[34]	Awareness Gap: Modern physicians lack awareness/information about AYUSH.[6] Lack of Interaction: Practitioners operate independently.[6] Limited Standardized Protocols: Insufficient research impedes creation of protocols.[6] Access to Ayurvedic Medicines: Challenges with regulated import/production/distribution.[10] Restrictions/Lack of Regulation: Concerns about untrained individuals and calls for licensing.[10] Research Evidence Base: Debate on need for scientific validation.[10]
Community/Patients	Symptom Relief: Cessation of muscle pains, eczema disappearance, stomach pain alleviation, improved sleep, clearer thoughts.[10] For NCDs: pain relief (82%), improved appetite (72%), reduced weakness (72%), reduced sickness (71%), improved sleep (70%), reduced tension/anxiety (61%).[8] Reduced weight, BP, sugar levels, relief from asthma, joint pain, backache, migraine, gas, depression.[8] Overall Health Improvement: >85% reported improvement.[8] Reduced Allopathic Medicine Usage: 73% reduced dosage, 52% reduced side effects, 24% stopped allopathic medicine.[8] Reasons for Acceptance: Low cost.[8] Fewer side effects.[8] Effectiveness and long-lasting lifestyle changes.[8] Holistic/natural approach.[10]	Lifestyle Changes/Adherence: Comprehensive plans challenging to sustain in modern, fast-paced lifestyles.[10] Patience Required: Treatments take longer to produce results.[10] Cost: Concern when not covered by insurance.[10] Lack of Support: Difficulties gaining support from family, friends, broader medical community.[10] Informal Learning of Yoga: Many learn from informal sources.[34] Preference for Alternative Systems: Barrier to allopathic medication adherence.[51]

VII. Evidence-Based Recommendations for Strengthening Integration

To effectively address the escalating burden of Non-Communicable Diseases (NCDs) in India through the integration of Ayurveda and Yoga, a multi-faceted and strategic approach is essential. The following recommendations are derived from the analysis of current policies, implementation challenges, and stakeholder perceptions. They aim to cultivate an "integrative ecosystem" for NCDs, fostering a supportive environment for both traditional and modern systems to thrive collaboratively. This involves simultaneous action on policy, research, training, public awareness, and collaborative models, addressing the interdependencies among these areas.

Policy and Governance

- **Strengthen Implementation of Existing Policies (Short term Approach-1-2 years)**: It is crucial to move beyond policy formulation to robust implementation. This requires addressing the identified gaps in health service delivery, workforce availability, health information systems, and financing within existing frameworks like the National Health Policy 2017, National AYUSH Mission (NAM), and National Programme for Prevention and Control of Cancer, Diabetes, Cardiovascular Diseases and Stroke (NP-NCD).[43]
- **Enhance Multisectoral Participation(Medium term Approach 2-5 years)**: The vision of a "Whole of Government" approach, as outlined in the National Multisectoral Action Plan (MSAP), must be fully realized.[43] This involves actively engaging non-health sectors and ensuring they understand and own their role in NCD prevention, moving beyond viewing it solely as a health sector domain.
- **Prioritize NCDs in State Health Budgets (Long Term Approach 5 years or longer)**: States should increase budget allocation for NCD programs and ensure optimal utilization

of these funds, with a particular focus on preventive and promotive activities, which are often underfunded.[43]

Research and Standardization

- **Promote Large-Scale Clinical Trials(Long Term Approach 5 years or longer)**: Conduct more rigorous, large-scale randomized controlled trials (RCTs) to scientifically validate the efficacy and safety of specific Ayurvedic and Yogic interventions for NCD prevention and management. This will build a robust evidence base necessary for wider acceptance and integration.[2]
- **Develop Standardized Protocols (Medium Term Approach 2-5 years)**: Formulate and standardize treatment protocols and Standard Operating Procedures (SOPs) for integrative NCD management in close collaboration with AYUSH experts and modern medicine practitioners. This is essential to ensure consistency, quality, and replicability of integrated care.[6]
- **Investigate Synergistic Interactions (Long Term Approach 5 years or longer)**: Prioritize research on the synergistic interactions between allopathic and AYUSH medicines. Understanding these interactions is crucial for developing truly comprehensive and effective integrative approaches that maximize benefits and minimize potential adverse effects.[6]
- **Strengthen Evidence Dissemination (Long Term Approach 5 years or longer)**: Encourage leading peer-reviewed journals to have dedicated sections for traditional medicine research and ensure that findings from Ayurvedic and Yogic studies are widely published and accessible to the broader scientific and medical community.[10]

Training and Capacity Building

- **Sensitize Modern Medicine Physicians (Long Term Approach 5 years or longer)**: Implement mandatory training and sensitization programs for modern medicine physicians on evidence-based AYUSH practices, their underlying principles, and their role in NCD prevention and management. This will help bridge the current awareness gap and foster mutual respect.[6]
- **Develop Interdisciplinary Curricula (Long-term Approach 5 years or longer)**: Integrate AYUSH concepts into the curricula of medical students and other healthcare professionals to foster early understanding and collaboration between AYUSH and modern medicine systems.[6]
- **Strengthen PHC Training (Long Term Approach 5 years or longer)**: Enhance the training components for Primary Health Centre (PHC) doctors in NCD management, potentially integrating relevant AYUSH principles and practices into their protocols.[18]
- **Expand Task-Shifting Initiatives (Long Term Approach 5 years or longer)**: Clearly define and expand the role of AYUSH practitioners in NCD care through well-structured task-shifting initiatives, providing them with adequate training and regulatory support to address workforce shortages effectively.[18]

Public Awareness and Community Engagement

- **Increase Public Awareness Campaigns (Long Term Approach 5 years or longer)**: Launch targeted and culturally appropriate communication campaigns (Information, Education, and Communication/Behavior Change Communication - IEC/BCC) to increase public awareness about the benefits of AYUSH systems for NCD prevention and management.[36] These campaigns should highlight the low cost and fewer side effects of traditional interventions.

- **Promote Community Mobilization (Long Term Approach 5 years or longer)**: Conduct community mobilization and sensitization programs, leveraging existing platforms and cultural events like International Day of Yoga, to encourage active participation and adoption of Ayurvedic and Yogic lifestyle practices.[6]
- **Provide Practical Support for Adherence(Long Term Approach 5 years or longer)**: Offer practical support and education to patients to help them adopt and adhere to Ayurvedic and Yogic lifestyle modifications, addressing challenges related to modern lifestyles, cost, and social support. This could include group sessions, peer support, and accessible resources.[10]
- **Formalize Yoga Training (Medium to Long Term Approach 5 years or longer)**: Promote formal, guided yoga training through certified instructors to ensure proper technique and maximize therapeutic benefits, moving beyond informal learning from unverified sources.[34]

Collaborative Models and Infrastructure

- **Adopt Integrative Care Models (Long Term 5 years or longer)**: Implement and expand integrative care models where practitioners from different systems (e.g., AYUSH and modern medicine) collaborate to discuss and determine the best approach for patient health issues, such as the NIMHANS model.[6] This should be scaled across primary, secondary, and tertiary care levels.
- **Expand Co-location of Facilities (Long Term 5 years or longer)**: Continue and expand the co-location of AYUSH facilities at PHCs, CHCs, and DHs to improve accessibility and patient choice, making integrated care a seamless option within the existing healthcare infrastructure.[35]
- **Leverage eHealth and mHealth: Integrate eHealth and mHealth tools for health education (Medium to Long term 2 to 5 years or longer)**, remote monitoring, and self-

management support for NCDs, ensuring that AYUSH-based content and interventions are incorporated into these digital platforms.[18]

- **Address Regulatory Barriers for Medicines (Medium Term 2-5 years)**: Review and reform regulatory frameworks that may hinder the import, production, and distribution of high-quality Ayurvedic medicines to ensure their widespread availability and accessibility.

Discussion

The principal findings derived from the comprehensive analysis conducted on the role of integrated Ayurveda and Yoga in addressing the Non-Communicable Disease (NCD) epidemic in India are presented here.

The results are meticulously collated from an extensive review of existing peer-reviewed literature, governmental policy documents, institutional reports, and other relevant data sources, with a specific focus on both preventative and curative paradigms. The findings are systematically organized into thematic areas, encompassing the evidence-based application of Ayurveda and Yoga in specific NCDs, the current status and effectiveness of their integration into the national healthcare framework, the perceptions and experiences of various stakeholders, and the prevailing challenges and opportunities pertinent to this integration.

1. Integration of Ayurveda and Yoga within India's Healthcare Framework

1.1. Current Level of Integration

The analysis indicates a clear and deliberate governmental strategy aimed at integrating AYUSH systems, particularly Ayurveda and Yoga, into the mainstream healthcare delivery system in India. This strategic integration is evidenced by several key initiatives:

- **Co-location of AYUSH Facilities:** A widespread policy involves the co-location of AYUSH facilities and personnel within existing government healthcare infrastructure, including Primary Health Centres , Community Health Centres , and District Hospitals . This aims to provide patients with a choice of medical systems and improve accessibility to traditional healthcare.[60,68]
- Policy Direction/Guidance:The Government of India has adopted a strategy of Co-location of Ayush facilities at Primary Health Centres (PHCs), Community Health Centres (CHCs)

and District Hospitals (DHs), thus enabling the choice to the patients for different systems of medicines under a single window." This is a key objective of the National AYUSH Mission (NAM).[85]

- **Establishment of Integrated AYUSH Departments:** Integrated AYUSH Departments have been established in several Central Government Hospitals and institutions, fostering a collaborative environment between conventional and traditional medical practitioners.[60,66,70]

- Policy Direction/Guidance:The Government of India, through the National AYUSH Mission (NAM), aims to provide patients diverse medical choices by co-locating AYUSH facilities within Primary Health Centres (PHCs), Community Health Centres (CHCs), and District Hospitals (DHs).To foster integrative healthcare, the Ministry of AYUSH and MoH&FW have jointly established Integrated AYUSH Departments in Central Government Hospitals. Examples include the Departments of Integrative Medicine at Vardhman Mahavir Medical College & Safdarjung Hospital and Lady Hardinge Medical College, New Delhi.[72]

- **Development of Specialized Institutions:** The establishment and promotion of specialized institutions such as the All India Institute of Ayurveda in New Delhi, which provides advanced Ayurvedic care for various NCDs, and the development of the Central Research Institute of Yoga & Naturopathy in Dibrugarh as a Centre of Excellence for Cardiovascular Diseases, underscore the commitment to developing high-quality AYUSH services and research for NCDs.[58,70]

- **Policy Direction/Guidance**:The Ayurswasthya Yojana, a Central Sector Scheme initiated in FY 2021-22, features an 'Ayush and Public Health' component. This component funds projects aimed at managing lifestyle disorders and non-communicable diseases (NCDs) using AYUSH interventions. Notably, the All India Institute of Ayurveda (AIIA) is

specifically recognized for providing specialized treatments for obesity and related lifestyle disorders under this initiative.[65]

- **Inter-Ministerial and Inter-Council Collaborations:** Active collaborations exist between the Ministry of AYUSH, the Central Council for Research in Ayurvedic Sciences , the Indian Council of Medical Research, and the Council of Scientific and Industrial Research . These collaborations are focused on promoting research, validating traditional practices, and developing integrative healthcare protocols.[66]
- **Policy Direction/Guidance:**The Central Research Institute of Yoga & Naturopathy (CRIYN) is "to be developed as the Centre of Excellence in Yoga & Naturopathy for Cardiovascular Diseases (CVD) of India, to develop protocols for management of Non-Communicable Diseases (NCD)". This is part of the broader aim to integrate traditional practices with modern healthcare.[63]

1.2. Policy-Level Implementations and Effectiveness

Several national policies and programs actively support and guide the integration of AYUSH systems for NCD management:

- **National Health Policy (NHP) 2017:** This policy explicitly promotes "Pluralism" in healthcare, promoting the integration of AYUSH systems in order to provide greater access to care and attain holistic health results. It seeks to capitalize on AYUSH's capabilities for national health objectives and is in line with global traditional medicine agendas.
- **NAM (National AYUSH Mission):** NAM, which was first introduced in 2014 and has since been updated, seeks to offer AYUSH treatments that are both affordable and accessible nationwide. Its components include strengthening AYUSH educational systems, ensuring quality control of AYUSH drugs, promoting sustainable availability of raw materials, and supporting AYUSH Wellness Centres (including Yoga & Naturopathy facilities) and School Health Programs.

- **NP-NCD-AYUSH Integration Project:** The integration of AYUSH components within the NP-NCD (National Programme for Prevention and Control of Cancer, Diabetes, Cardiovascular Diseases and Stroke) represents a significant operational initiative. Pilot projects under this integration have demonstrated tangible positive outcomes, particularly in diabetes management, where individuals with prediabetes and type 2 diabetes saw substantial reductions in fasting and postprandial blood sugar levels while using Ayurvedic medicine, lifestyle changes, and yoga. For example, during 2019-2020, the program was implemented in three districts, enrolling 14,773 NCD patients and engaging 329,565 individuals in Yoga classes through 2,784 camps. (A summary of key government policies and initiatives is provided in Table 11).

Despite these robust policy frameworks and successful pilot initiatives, the analysis identified a discernible gap between policy intent and comprehensive on-the-ground implementation. Challenges persist across various health system building blocks, including deficiencies in service delivery mechanisms, adequacy of trained workforce, robustness of health information systems, and consistency in financing and resource allocation, thereby hindering the full realization of integrative healthcare goals.

2. Perceptions and Experiences of Stakeholders

2.1. Healthcare Providers

- **Ayurvedic Practitioners:** Generally emphasize the holistic and individualized philosophy of Ayurveda, focusing on treating the root cause of disease (*Nidana Parivarjana*) and promoting the body's innate healing capabilities. They often perceive Comparing Ayurveda to traditional medicine, it is a kinder method with less adverse effects. They do, however, face obstacles like restricted access to a complete range of standardized Ayurvedic medications because of supply chain and regulatory problems, and they voice concerns

about the lax regulation of untrained Ayurvedic practitioners, calling for strict licensing and accreditation.

- **Modern Medicine Physicians:** While many acknowledge the importance of lifestyle interventions and complementary approaches like pulmonary rehabilitation for CRDs, a significant awareness gap persists regarding specific AYUSH practices, their evidence base, and indications. Limited interaction and formal platforms for collaboration between practitioners of different medical systems, coupled with an absence of widely accepted standardized integrative treatment protocols, were identified as substantial barriers to effective integration and cross-referral.

2.2. Community/Patients

Patients' perceptions and experiences with AYUSH treatments and Yoga for NCD management are predominantly positive, which significantly influences their acceptance and adoption of these modalities. Key findings include:

- **Significant Symptom Relief:** Patients consistently reported experiencing varying degrees of relief from NCD-related symptoms. For instance, a study highlighted that patients undergoing AYUSH and Yoga interventions reported substantial pain relief (82%), improved appetite (72%), reduced weakness (72%), improved sleep quality (70%), and reduced tension/anxiety (61%). Reductions in weight, blood pressure, and blood sugar levels, as well as relief from conditions like asthma and migraine, were also commonly reported.
- **Reduced Reliance on Allopathic Medicine:** A notable impact on conventional medicine usage was observed, with 73% of patients reporting a reduction in their allopathic medicine dosage, 52% experiencing fewer side effects from allopathic medicines, and a significant 24% being able to completely stop their allopathic medication after commencing AYUSH treatment.

- **Primary Reasons for Acceptance:** The high acceptance of AYUSH and Yoga is driven by several factors, including the perception of lower cost compared to conventional treatments, the belief that these interventions have fewer adverse side effects, their perceived effectiveness in both prevention and long-term management, and an appreciation for their holistic and natural approach to health.
- **Challenges to Adherence:** Despite positive perceptions, patients encounter challenges in adhering to Ayurvedic and Yogic regimens. These include the demanding nature of comprehensive lifestyle and dietary changes required, which can be difficult to sustain in modern, fast-paced lifestyles; the often longer duration required to observe tangible results, necessitating patience; occasional concerns about the absolute cost of treatments, particularly when not protected by health insurance; and a documented absence of sufficient assistance from relatives or the larger medical community. Furthermore, many individuals learn Yoga practices from informal sources, which may compromise the correctness of techniques and optimal therapeutic benefits. (Table 13 provides a detailed summarization of the perceived benefits and challenges from stakeholder perspectives).

3. Challenges and Opportunities in Integration

The comprehensive analysis highlighted several critical implementation challenges that span across the World Health Organization's (WHO) six building blocks of health systems. These include:

- **Health Service Delivery:** Deficiencies in the operational effectiveness of district-level NCD cells, inconsistent access to essential diagnostics and medicines, and poorly functional population-based NCD screening programs with high loss-to-follow-up rates.

- **Health Workforce:** Acute shortages of adequately trained human resources for NCD screening and management, insufficient training provided under NP-NCD, and infrequent NCD management training for Primary Health Centre (PHC) doctors.
- **Health Information Systems:** The NP-NCD Management Information System (MIS) is not yet fully operational nationwide, leading to a lack of comprehensive NCD databases and inconsistencies in data collection and reporting.
- **Access to Essential Medicines:** Irregular and inadequate supply of essential drugs and consumables in NCD clinics, often compelling patients to rely on private pharmacies and incur higher out-of-pocket expenditures.
- **Financing:** Persistently low central budget allocations for NCD programs, compounded by under-utilization of allocated funds in many states, and an insufficient focus on health promotion and IEC activities due to limited budgets.
- **Leadership/Governance:** At many levels of healthcare delivery, there are deficiencies in surveillance, monitoring, and evaluation systems, a poor emphasis on health promotion, and insufficient multisectoral engagement. Progress is further hampered by a lack of collaboration with non-health departments, which frequently lack ownership of their roles in NCD prevention. Other difficulties include the need for more thorough, extensive clinical validation of Ayurvedic and Yogic treatments as well as the lack of consistency in Ayurvedic formulations and doses.

Despite these challenges, several significant opportunities exist to strengthen the integration of Ayurveda and Yoga for NCD management:

- **Task Shifting and Skill Enhancement:** Systematically training and empowering mid-level healthcare providers, including AYUSH practitioners, to undertake defined NCD care

tasks presents a viable strategy to address workforce shortages and enhance the accessibility of care.

- **Leveraging eHealth and mHealth Technologies:** The expanding reach of electronic health (eHealth) and mobile health (mHealth) tools offers a potent avenue for disseminating health education, supporting self-management behaviors, improving treatment adherence (e.g., mCessation for tobacco, mDiabetes for diabetes), and facilitating remote monitoring and clinical decision support.
- **Fostering Public-Private Partnerships (PPPs):** Strategically leveraging the complementary strengths and resources of both public and private sectors through well-structured PPPs can help overcome deficiencies in service delivery and address inequities in health service distribution.
- **Strengthening Community Engagement and Mobilization:** Promoting participatory health governance through active community engagement and mobilizing Civil Society Organizations (CSOs) can significantly improve health awareness, health-seeking behaviors, and the accountability of health services. (A detailed summary of these implementation challenges and opportunities is presented in Table 12).

This chapter has meticulously outlined the primary results derived from the comprehensive analysis undertaken. A detailed interpretation of these multifaceted findings and their broader implications for policy, practice, and future research will be elaborated upon in the subsequent Discussion chapter.

Conclusion

The escalating burden of Non-Communicable Diseases (NCDs) in India presents a formidable public health challenge, necessitating innovative and comprehensive healthcare strategies. The deeply rooted traditions of Ayurveda and Yoga offer a powerful, culturally congruent, and cost-effective approach to both prevent and manage these chronic conditions.[1] Their emphasis on holistic well-being, personalized lifestyle modifications, and mind-body harmony provides a unique and invaluable complement to conventional medicine.[1]

Evidence consistently suggests that Ayurvedic principles such as Dinacharya (daily regimens) and Ritucharya (seasonal regimens), along with Yogic practices including Asanas (physical postures), Pranayama (breathing techniques), and Dhyana (meditation), can significantly impact the incidence and progression of major NCDs. This includes cardiovascular diseases, diabetes, cancers, and chronic respiratory diseases.[1] Government initiatives, notably the NP-NCD-AYUSH integration project, have demonstrated tangible benefits, showing significant reductions in blood sugar levels for prediabetic and type 2 diabetic patients when Ayurveda interventions are combined with lifestyle modification and Yoga.[7] Furthermore, patient perceptions indicate widespread acceptance and reported benefits from AYUSH and Yoga, with low cost and fewer side effects cited as key advantages over conventional treatments.[8]

However, a critical gap exists between ambitious policy intent and widespread implementation. While significant policy frameworks and pilot successes are in place, translating these into broad, sustained health outcomes remains a challenge. This requires sustained political will, increased and optimally utilized financial allocation, robust research for standardization and evidence generation, comprehensive interdisciplinary training for healthcare professionals across both systems, and active community engagement to foster adherence to demanding lifestyle changes. By systematically addressing these challenges and leveraging the synergistic potential of integrated Ayurveda and Yoga, India can forge a more resilient, equitable, and effective healthcare

system. This will not only mitigate its growing NCD burden but also promote holistic well-being for its vast population, moving towards a truly integrated and comprehensive healthcare landscape.[6]

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