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REVIEW ARTICLE

Modern Lifestyle and their Impact on Health: Development of the Human Disease Prediction Model

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Key words: Communicable Diseases, Cardiovascular diseases, Unhealthy Habits, Modifiable lifestyle factors, Risk score.

Abstract

In India, lifestyle or non-communicable diseases account for more than 61% of all deaths (NCDs). Lifestyle diseases include conditions connected to smoking, alcoholism, and drug addiction, which ultimately goes to atherosclerosis, heart disease, stroke, obesity, and type 2 diabetes. Activities that discourage individuals from exercising and encourage them to eat poorly can result in a number of health issues with potentially fatal consequences including chronic non-communicable diseases. A comprehensive and long-term strategy for cardiovascular research and related prevention must be developed. Here we discussed on all lifestyle diseases and their impact on humans.The risk factors for lifestyle diseases for the prediction using machine learning techniques and to persuade them to adopt a healthy lifestyle in order to lower the risk of contracting a lifestyle-related disease in the future has also been discussed.

Introduction:

The major causes of death worldwide are non-communicable diseases. Cancer, type 2 diabetes, and cardiovascular diseases are examples of noncommunicable (NCDs), which account for 54% and 43 %, accordingly, of all deaths and disability-adjusted life years (DALYs) in India.The majority of these non-communicable diseases have similar lifestyle risk factors that may be avoided, such as smoking, heavy drinking, high cholesterol, sedentary behavior, and obesity. The risk of morbidity and mortality is dramatically increased when these risk factors are clustered together.

Long-lasting diseases include NCDs. These illnesses are not contagious and cannot spread to other people. While some NCDs advance quickly, others advance slowly or result in chronic symptoms that need long-term care and management. Children are also at risk, but they impact both adult males and women. Even though they may appear healthy, these illnesses still affect people (Balwan *et al.*, 2021).

The fact that NCDs harm people during their prime years of productivity is one of the gravest worries about them. They also contribute to "premature deaths," which are fatalities that occur earlier than the typical lifespan. Although NCDs can strike at any age, older people are more susceptible to them.

NCD Characteristics

Complex Roots: a number of factors, including as population ageing, rapid urban expansion, and the internationalization of unhealthy behaviours, have an impact on non-communicable diseases.Obesity and associated signs of underlying lifestyle choices may include higher blood lipids, blood glucose levels, blood sugar, blood pressure (Basu *et al.*, 2016).

Multiple risk factors: the onset and progression of NCDs are influenced by a variety of risk factors.There are many kinds of risks and can be categorized into three main risk groups; Behavioral risk factors that can be changed, risk factors that cannot be changed, and metabolic risk variables many of which are prevalent in numerous diseases.

Prolonged latency: the latency period for NCDs is lengthy and can range from a few years to decades (Boles *et al.*, 2017).

Noncommunicable origin (noncontagious): NCDs are not conveyed from one person to another, hence it is a given that these diseases arise in a person from non-contagious origins.

A prolonged course of illness: due to the chronic nature of NCDs, the illness's progression is frequently drawn out and a patient may have to wait years before being compelled to choose medical treatment or intervention (Caban *et al.*, 2015).

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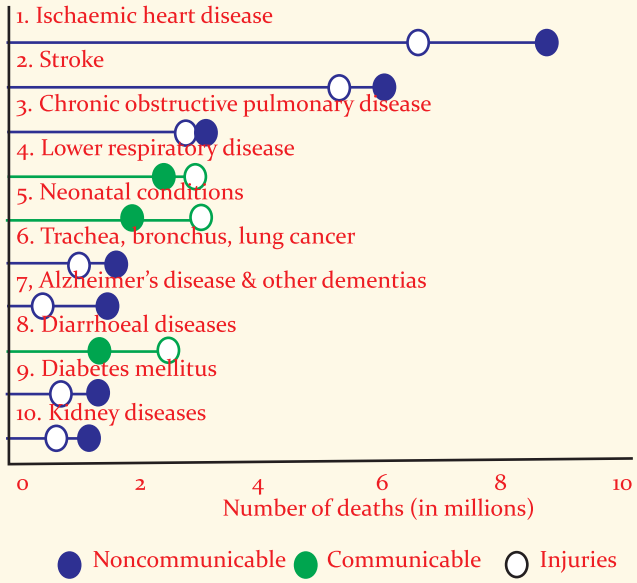

Figure 1: Top 10 global causes of death (Source WHO)
1WHO (2017). The top 10 causes of death. Fact Sheet.

Functional limitation or incapacity: NCDs can result in situations that make it challenging for the patients to lead normal lives. Chronic NCD patients might not be able to go to work, participate in regular physical exercise, or eat normally.

Causes of lifestyle diseases

Dehydration: muscle exhaustion, strain, tendinitis, and other musculoskeletal system diseases are frequently brought on by dehydration of the muscles and tendons (Kataria *et al*., 2020).

Malnutrition: chronic diseases are brought on by both an excess of dead foods and a deficiency of living nutrients in our diets.

Inflammation: the majority of lifestyle-related illnesses, such as heart disease and musculoskeletal conditions, are caused by inflammation (Nethan *et al*., 2017).

Fatigue: numerous major medical conditions, including as obesity, mental impairment, high blood pressure, heart disease and stroke are linked to sleep deprivation.

Poor physical fitness: poor levels of physical fitness are directly correlated with a higher risk of developing chronic diseases, as is commonly accepted.

Poor health habits : your health is negatively impacted by smoking, drinking, abusing drugs or using them excessively, sweets, fast food, soft drinks, chocolate, artificial sweeteners, worrying, and stress (Polat *et al*., 2017).

Modifiable behavioral risk factors: the likelihood of NCDs is increased by behavioural risk factors include excessive alcohol use, poor eating habits, tobacco use (both smoking and eating), poor body posture, physical inactivity and a disrupted biological clock. Desk jobs in the modern workplace and work-related stress are both recognised as significant risk factors for NCDs. According to the WHO, smoking results in more than 7 million deaths per year and that number is expected to rise sharply in the years to come. Each year, around 1.65 million NCD deaths are caused by alcohol usage, whereas excessive sodium consumption in the diet results in 4.1 million fatalities annually (Sinha *et al*., 2017).

Non-modifiable risk factors: non-modifiable risk variables are risk factors that cannot be managed or changed by the use of an intervention. It includes Age, Genetics, Race, and Gender.

Metabolic risk elements: four significant changes in the metabolic systems caused by metabolic risk factors raise the risk of NCDs; Increased blood pressure, Obesity, Increased blood glucose levels or hyperglycemia, Increased levels of fat in the blood or hyperlipidemia.

With 19% of all fatalities worldwide attributable to it, elevated blood pressure leads all metabolic risk factors, followed by obesity and hyperglycemia (Fam *et al*., 2017).

Four significant diseases based on lifestyle

Cardiovascular diseases: the leading metabolic risk factor in the world is elevated blood pressure, which is responsible for 19% of all fatalities worldwide. It is followed by obesity and hyperglycemia. Ischaemic heart disease, Peripheral arterial disease, Stroke, Congenital heart disease. More than 17 million fatalities a year are attributed to CVDs, which are the leading cause of death worldwide. By 2030, the number is predicted to increase to over 23 million annually.

Major risk factors that can be changed

- Elevated blood pressure Unusual blood lipid levels nicotine use
- Active inactivity Diabetes
- Heavy alcohol use
- Obesity
- Unhealthy diet (salt)

Risk factors that cannot be changed

- History of Family
- Gender
- Ethnicity or race Other

Other Risk Factors

- Excess homocysteine in blood - Inflammatory markers (Creactive protein)
- Blood Clotting (increased fibrinogen levels in the blood) Lipoprotein(a)

Diabetes: a metabolic illness called diabetes affects how the body uses food for both physical growth and energy. Type 1, Gestational, Pre-Diabetes, and Type 2 are the four different kinds of diabetes. The most prevalent kind of diabetes in the world, type 2, is brought on by behavioral risk factors that are changeable.

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Major risk factors that can be changed
- Unhealthy diets
- Physical Inactivity Obesity or Overweight
- High Blood Pressure
- High Cholesterol Heavy alcohol use Psychological stress
- High consumption of sugar
- Low consumption of fiber

Risk factors that cannot be changed
- Advanced age Family history/ genetics Race
- Distribution of fat in the body
- Other

Other Risk Elements
- Presence of
- autoantibodies Low
- socioeconomic status

Cancer: cancer affects several bodily sections and is characterized by the rapid development of abnormal cells in those areas. It can also spread to other areas of the body. Every year, more than 7 million people die from cancer, and lifestyle factors are to blame for 30% of these illnesses.

Types	Major risk factors that can be changed	Risk factors that cannot be changed
Cervical	•Smoking Poverty •Human papilloma virus infection (hpv)	•Immune deficiencies Family history
Lung	•Smoking •Passive smoke •Radiation therapy Being exposed to asbestos, radon, chromium, nickel, arsenic, soot, or tar •Living in air-polluted place	
Breast	•Hormone therapies Weight •physical activity	•Race •Genetics BRCA1 and BRCA2 genes Age
Prostate	•Obesity •Bad food habits •Low intake of fiber	•Age Race
Colorectal	•Unhealthy diet •Insufficient physical activity	•Age Race •Family history Diabetes

Respiratory diseases: chronic respiratory disorders (CRD), among of the most underdiagnosed illnesses, are a significant cause of death worldwide, with 90% of fatalities occurring in low-income nations.The two primary categories of CRDs are asthma and chronic obstructive pulmonary disease (COPD).

Major risk factors that can be changed Risk factors that cannot be changed
- Cigarette smoke Dust and chemicals Environmental tobacco smoke Air pollution Infections
- Genetics • Genetics
- Age

Respiratory Diseases: chronic respiratory disorders (CRD), among of the most underdiagnosed illnesses, are a significant cause of death worldwide, with 90% of fatalities occurring in low-income nations.The two primary categories of CRDs are asthma and chronic obstructive pulmonary disease (COPD) (Benton *et al*., 2021).

Major risk factors that can be changed
- Cigarette smoke Dust and chemicals Environmental tobacco smoke Air pollution Infections
- Genetics

Risk factors that cannot be changed
- Genetics
- Age

NCD prevalence in India: some statistics

NCDs were the cause of 44% of lost disorder years of life (DALYs) and 60% of all fatalities in India. In India in 2004, they were thought to be in charge of 35% of all outpatient visits and 40% of all hospital admissions. The Global Burden of Disease Study 2013 provided estimates that the number of fatalities from the majority of the major NCDs grew by 42% between 1990 and 2013. According to estimates, overweight and obesity in India account for around 45% of the country's diabetes problem and 23% of its CVD problem.

Obesity: numerous national surveys conducted in India displayangrowth in the frequency of obesity. In India, there

Table 1: Obesity prevalence among Asian Indians living in India.

Author	Location	Age (yr)	Sample population Males	Females	Criteria of obesity (BMI kg/m² & WC cm)	Diabetes Prev. (%) Males	Females
Misra *et al*. 2005	North India (Ur)	38.9	640*		WC: 90(M); 80(F) 10.1	25.9	
Gupta *et al*. 2007	North India (Ur)	43.2(M) 44.7 (F)	226	232	BMI: 30, WC: 102 (M); 88 (F)	20.8	34.5
Chow et al. 2008	South India (Ru)	20–90	4535		BMI: ≥25 WC: 90 (M); 80 (F)	32.4	41.4
Bhardwaj *et al* .2011	North India (Ur)	>18	217	242	BMI : 25≥,WC :90 M( ) 80 F()	50 2	50
Gupta *et al* .2012	West India (Ur)	35? 70	4621		WC : 102≥ M( ) 88 F()	14 4	
ICMR -INDIAB -3	Tamilnadu,	20	1047	2521	BMI≥25	20 6	28 4
	Maharashtra,		1215	2594		15.7	17.6
	Jharkhand		921	2286		14.7	19.1
	Chandigarh		880	2336		24.2	38.7
Mohan *et al* .2016	Multi -centric	35 -70		6853	BMI≥25	22 5 # 45 6	@57 4@@

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are more than 135 million obese people. Gender Age, place of residence, socioeconomic position, and obesity measurement criteria are some of the variables that affect the frequency of obesity in India. The prevalence of generalized obesity (defined as a BMI of 25 kg/m2), as measured by the Indian Council of Medical Research-India Diabetes (ICMR-INDIAB) study, varies from 12.8% in Jharkhand (east India) to 32.3% in north India Chandigarh (Rohr *et al.*, 2019) .

Using WHO cutoffs for obesity, a multi-site study on 4608 women over 35 years old in India found that 33.6% of rural and 46.6 percent of urban women were overweight. The incidence of obesity/overweight (BMI >25 kg/m2) among rural women, urban-poor, and urban-middle class areas was reported as 22.5, 45.6, and 57.4%, respectively, in a recent study. South Asians usually have higher amounts of body fat, , liver fat and abdominal fatfor any given body mass index (BMI) (see below) and pancreas fat and lower levels of lean mass, in addition to having higher levels of insulin resistance and a dysmetabolic state than whites. It's interesting to note that even non-obese persons with diabetes have too much fat in all abdominal compartments, even around the abdominal organs (e.g. liver).

As a result, the metabolic risk among Asian Indians is not effectively represented by the BMI categories for obesity used in white populations. Asian Indian migrants in the United Kingdom can now be diagnosed with obesity using ethnically specific BMI cutoffs, which have been proposed (24-25.9 kg/m^2 and 26 kg/m^2, respectively, for overweight and obesity) .

Diabetes: India has more than 69 million people have type 2 diabetes, and by the year 2040, that figure is projected to reach 140 million, with nearly half of them still undiagnosed. Moreover, among all major ethnic groups, The incidence of pre-diabetes and diabetes is among the highest among Asian Indians, and the progression from pre-diabetes to diabetes occurs more swiftly in this group.As of early 2004, the inaugural ICMR multi-centric survey estimated prevalence rates of 2.3% and 1.5% in urban and rural areas, respectively.the prevalence of diabetes has increased dramatically over the preceding 40 years. According to the CARRS (Center for Cardio-metabolic Risk Reduction in South Asia) data, the prevalence of diabetes was overall 22.8% (21.5-24.1%) in Chennai, south India; 25.2% (23.6-26.7 percent) in Delhi, north India; and 16.3% in Karachi, Pakistan (15.2-17.3 percent). The prevalence of diabetes varies significantly by socioeconomic strata, place of residence (less so in rural areas), and other factors (less in low socio-economic stratum). The ICMR-INDIAB study found that diabetes prevalence ranged from 4.0% in rural Jharkhand, east India, to 14.7% in metropolitan Tamil Nadu, south India. Men experience a faster rate of growth in the prevalence of diabetes (3.33 per 1000 per year) than women do (0.88 per 1000 per year) Sharifi-Rad *et al.*, 2020).

Table 1: Prevalence of diabetes in India

Author	Place	Prevalence (%) Urban	Rural
Misra *et al.*, 2001	New Delhi	10.3	
Sadikot *et al.*, 2004	Multi-centric	4.6	1.9
Ramachandran *et al.*, 2008	Chennai	18.6	9.2
ICMR-INDIAB, 2011	Chandigarh	14.2	8.3
	Tamil Nadu	13.7	7.8
	Maharashtra	10.9	6.5
	Jharkhand	13.5	3.0
Gupta *et al.*, 2014	Multi-centric	15.7	
CARRS, 2015	Chennai	22.8	
	Delhi	25.2	
	Karachi	16.3	

Cardiovascular diseases dnd risk factors: there have been reports of higher CHD risk and cardiovascular mortality among South Asians compared to other ethnic groups, first from the UK, Singapore, and Fiji, then from Canada and the USA.Compared to other ethnic groups, South Asian migrants have a higher chance of developing a CVD before their time.According to a comprehensive review of research on CVD in Asian Indians conducted between January 2001 and October 2021, the prevalence was 2.5% – 12.6% in urban areas and 1.4% – 4.6% in rural regions.According to estimates, 11% of south Indians have a

Table 1: Prevalence of Cardio-vascular Diseases and Risk Factors

Author	n	Setting	Prevalence (%) CHD	Major risk factors HTN	DM	High cholesterol	Smoking
Mohan *et al.*, 2009	1262	U	11.0	M-14.9; L-8.4.	M-12.4; L-6.5	M-24.2; L-14.2	M – 5.6 L – 17.9
Gupta *et al.*, 2002	1123	U	8.2	36.9	12.2	39.1	23.9
Kamili *et al.*, 2007	3128	U/R	7.54				
Thankappan *et al.*, 2010	7449	U/R	-	28.8	14.8	54.1	42
CSI Kerala, CRP study, 2011	5193	U/R	15.7	39	21	23	31
Krishnan *et al.*, 2011	5167	U/R	12.5	49.59	15.23	52.31	28.05
Mohan et al., 2004-2007	6853	UM/UP/R	-				
	2229	UM	-	59.0	17.7	37.4	41.6
Mohan et al., 2006-2010	2008	UR	-	48.2	9.3	27.7	19.6
	2616	R	-	31.6	2.2	13.5	9.4

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Legend, Table-3; U-urban; R-rural; UM- urban middle class; UR-urban poor; R-rural; CHD-Coronary heart disease; HTN-Hypertension; DM-Diabetes mellitus; M-Middle income; L-Low income; CSI- Kerala CRP study, Cardiology Society of India, Kerala Chapter Coronary Artery Disease and its Risk Factors Prevalence study.

CVD, which is a 10-fold increase from the frequency in urban India.Studies from the Jaipur Heart Watch (conducted in the state of Rajasthan, north India) have also revealed a significant frequency of cardiovascular risk factors and coronary heart disease (CHD)(Table-3). In the sub-Himalayan states of Nagaland, Meghalaya, Himachal Pradesh, and Sikkim, CVD death rates range from 75-100 per 100,000 to a high of 360-430 per 100,000 in Andhra Pradesh, Tamil Nadu, Punjab, and Goa.In India, there is a dearth of information on the connection between diabetes and CVD.

Conclusion :

The goal of this study is to create a prediction model that might determine the likelihood of developing lifestyle-baseddiseases.All modifiable lifestyle risk variables that could be measured by the average person without a laboratory test were found in the first phase.This long-term cohort study sought to develop a unique lifestyle-based prediction model for different Diseases.We are aware of only a few research that has directly reported a Lifestyle Diseases prediction model. It is very important to predict the diseases at an early stage so that the disease can be cured at the earliest.The etiology of lifestyle Diseases has been shown to be strongly influenced by a number of lifestyle factors, including dietary patterns, physical inactivity, mental stress, body habitus (such as body mass index and waist), individual habits (such as smoking, sleeping, and exercising), and clinical conditions (such as diabetes, dyslipidemia, and hypertension).The currently available techniques are based on laboratory analyses of biochemical tests, but there isn't a widely used tool that forecasts the likelihood of developing CVD based on lifestyle factors.Only those features that can be quantified without a clinical test are included in the model. The suggested model is efficient and affordable, making it suitable for usage in poor nations.

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References:

Balwan, W.K. & Kour, S. (2021): Lifestyle Diseases: The Link between Modern Lifestyle and Threat to Public Health. *Saudi J. Med. Pharm. Sci.*, 7(4): 179-184.

Basu, J. & Avila, R. (2016): Hospital readmission rates in U.S. States: are readmissions higher where more patients with multiple chronic conditions cluster? *Health Serv. Res.*, 51:1135–1151.

Benton, M.L., Abraham, A., LaBella, A.L., Abbot, P., Rokas, A. & Capra, J.A. (2021): The influence of evolutionary history on human health and disease. *Nat. Rev. Gen.*, 22:269–283.

Boles, A., Kandimalla, R. & Reddy, P.H. (2017): Dynamics of diabetes and obesity: epidemiological perspective. *Biochem. Biophys. Acta.*, 1863:1026–1036.

Caban, J.J. & Gotz, D. (2015): Visual analytics in healthcare—Opportunities and research challenges. *J. Am. Med. Asso.*, 22:260–262.

Kataria, I., Siddiqui, M., Gillespie, T., Goodman, M., Dhillon, P.K., Bann, C. & Squiers, L. (2020): A research agenda for noncommunicable disease prevention and control in India. *Health Res. Policy Sys.*, 18:126

Nethan, S. & Sinha, D. (2017): Noncommunicable disease risk factors and their trends in India. *Asian Pac. J. Cancer Prev.*, 18(7):2005–2010.

Polat, H. & Mehr, H.D. (2017): Diagnosis of chronic kidney disease based on support vector machine by feature selection methods. *J. Med. Syst.*, 41:55

Rohr, J.R., Barrett, C.B., Civitello, D.J., Craft, M.E., Delius, B., DeLeo, G.A., Hudson, P.J., Jouanard, N., Nguyen, K.H., Ostfeld, R.S., Remais, J.V., Riveau, G., Sokolow, S.H. & Tilman, D. (2019): Emerging human infectious diseases and the links to global food production. *Nat. Sustain.* 2:445–456

Sharifi-Rad, M., Anil Kumar N.V., Zucca, P., Varoni, E.M., Dini, L., Panzarini, E., Rajkovic, J., Tsouh Fokou, P.V., Azzini, E., Peluso, I., Mishra, P.A., Nigam, M., Rayess, E.l.Y., Beyrouthy, M.E., Polito, L., Iriti, M., Martins, N., Martorell, M., Docea, A.O., Setzer, W.N., Calina, D., Cho, W.C. & Sharifi-Rad, J. (2020): Lifestyle, oxidative stress, and antioxidants: back and forth in the pathophysiology of Chronic Diseases. *Front. Physiol.*, 11:694.

Sinha, R. & Pati, S. (2017): Addressing the escalating burden of chronic diseases in India: need for strengthening primary care. *J. Fam. Med. Prim. Care.*, 6(4):701–8

Tabish, S.A. (2017): Lifestyle diseases: consequences, characteristics, causes and control. *J. Cardiol. Current Res.*, 9(3): 00326.