The Path where our Lifestyle is Taking us: Shift in Onset of Non-Communicable Diseases

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ABSTRACT

Globally, the burden of non-communicable diseases (NCDs) is rising. To assess the trends in the age of occurrence of non-communicable, age-related diseases this study was performed in the three districts of Uttarakhand, in both rural and the urban settings. The study comprised of both male and female subjects between the age group of 15 years to 55 onwards. The respondents were categorized into three age groups range as- 15-35 years, 36-55 years, and above 56 years. Starting from the age of 5 years, each age group is also categorized decade-wise e.g. age group of 56 years and above was divided into six decades starting from the age of five years. The present study showed that the occurrence of age-related diseases, among the age group 56 years and above, was seen during their 40s while in the other two age groups, occurrence was recorded in the 30s itself. Comparing the third decade, i.e., the 30s of all the three age groups, none of the subjects was suffering from age-related disease among 56 years and above while among 36-55 years of age, 0.57 percent and among 15-35 years of age, 1.35 percent of subjects suffered from hypertension. The occurrence of these diseases was more in the urban areas as compared to rural areas. These results throw an insight onto the necessity for government bodies to focus on key factors leading to this trend, improving health care quality, and emphasis on a healthy lifestyle.

Keywords- Non-communicable diseases, cardiovascular diseases, diabetes, hypertension, onset of diseases.

I. INTRODUCTION

Globally, the burden of non-communicable diseases (NCDs)—chronic, metabolic, heart, cancerous, and psychological illnesses; and injuries that are not transmittable by contact—is rising. Between 1990 and 2010, deaths from NCDs rose by nearly 8 million, and these conditions now account for two of every three deaths (34.5 million) per year worldwide [1].

The incidences of NCDs are increasing rapidly in low- and middle-income countries (LMICs). Some patients have access to the same treatments as available in high-income countries, but most do not, and therefore, different strategies are needed. A recent analysis of global trends in systolic blood pressure found that although there has been a fall globally since 1980, the decline has been greatest in high-income countries, whereas it has increased in some LMICs [2]. India's burden of non-communicable diseases (NCDs) is escalating. NCDs typically present in individuals aged 55 years or older in many developed countries, but their onset occurs in India a decade earlier (≥45 years of age) [3],[4].

Cardiovascular diseases (CVDs) account for about one-half of NCD deaths, and the majority of cardiovascular disease deaths occur in low- and middle-income countries [5]. Globally, the prevalence of cardiovascular diseases is incessantly progressing in both developed and developing nations. Diabetic patients with insulin resistance are even at a greater risk of cardiovascular disease. Obesity, high cholesterol, hypertriglyceridemia and elevated blood pressure are mainly considered as major risk factors for diabetic patients afflicted with cardiovascular disease [6].

The increase in the prevalence of obesity represents a worldwide phenomenon in all age groups and is pathologically and genetically correlated with several metabolic and cardiovascular diseases, representing the most frequent age-related diseases. Obesity poses new health problems especially when it occurs in the context of other diseases, many of them frequently affect elderly subjects. Immunity and metabolism are highly integrated factors in aging and age-related diseases. Obesity and related complications are a major global epidemic [7]. According to Emelia J. Benjamin the prevalence of obesity among adults and youth in the United States increased significantly from 1999 to 2000 through 2013 to 2014. Population with "metabolically healthy obesity" shows the transition to metabolically unhealthy over time [8]. In addition, the risk of CVDs, especially Heart Failure could rise with existing obesity even when there are no metabolic risk factors present.

The prevalence of diabetes is increasing worldwide, with the greatest increases occurring in low- and middle-income countries. In most developed countries, type 2 diabetes is presently the leading cause of end-stage renal disease and also contributes substantially to cardiovascular disease. In countries with weaker economies type 2 diabetes is rapidly replacing communicable diseases as a leading cause of kidney disease and is increasingly competing for scarce health care resources [9]. Dabelea D, et al. found in their study that among teenagers and young adults who had been

diagnosed with diabetes during childhood and adolescence, the prevalence of complications and comorbidities was higher among those with type 2 diabetes compared with type 1, but frequent in both groups. Therefore, based on their findings, they supported early monitoring of these patients for the development of any complications [10]. The diabetes analysis by India State-Level Disease Burden Initiative Diabetes Collaborators shows that diabetes contributes 3·1% of the total mortality burden in India, with slightly higher contributions among women 3.4% than men 2.9%. The age-standardised diabetes prevalence rose by 29.7% in 1990–2016. Diabetes is especially prevalent in southern states [11].

In European countries and the USA, one in three adults suffers from arterial hypertension based on current guideline definitions. The differences between women and men in younger age groups (18 and 29 years), shows only a prevalence of 1.3% in women vs. 8.5% in men and 7.3% in women vs. 15.8% in men in the group between 30 and 44 years. In contrast, hypertension is more common in women than in men in the elderly population [12]. In a study conducted by Andersson C, et al. it was observed that among nonhypertensive, young- to middle-aged adults, parental hypertension is associated with greater arterial stiffness indices; and this observed association may potentially reflect a subclinical precursor of future high blood pressure [13].

According to a study conducted by Mahmood FM in Saudi Arabia, physical inactivity and consumption of unhealthy diet are common among adult Saudi citizens, leading to the high prevalence of obesity, hypertension, and diabetes. Moreover, the size of undiagnosed hypertension and diabetes is alarmingly large, indicating failure of screening at the primary care level. Similarly, treatment failure among diabetic and hypertension patients is high, indicating poor-quality care and low patient compliance at the primary care level [14].

In both global and national modeling studies, the associations of suboptimal diet with overall health have been estimated. Understanding the relations of individual dietary components with the cardiometabolic disease at the population level is essential to identify priorities, guide public health planning, and inform strategies to alter these dietary habits and improve health. In addition, the differences in these estimated health burdens by underlying personal characteristics, such as age, sex, race/ethnicity, and education, are relevant to consider more targeted approaches to reducing disparities [15] [16].

The rapid shift in the stage of nutrition towards a pattern of degenerative disease is accelerating in the developing world. There appears to reflect a basic shift in eating preferences, induced mainly by shifts in income, prices, and food availability. The emergence of a range of chronic non-infectious diseases – including Coronary Heart Disease (CHD), hypertension (HTN), various cancers, diabetes mellitus, dental caries, and various bone and joint diseases has been a point of concern for quite a while now.

Keeping these points in view, the present study was carried out to assess the trends in the age of occurrence of non-communicable, age-related diseases in rural and urban settings, in the three districts of Uttarakhand.

II. METHODOLOGY

The present study was conducted in the Garhwal region of Uttarakhand. Three districts Dehradun, Haridwar, and Tehri Garhwal were selected from this region by using purposive sampling methods.

From each district, two blocks and from each block two rural and two urban areas were randomly selected for the study. Nearly twenty families were taken from each area. Total 480 families representing different socio-economic statuses were selected for the study. The study comprised of both male and female subjects between the age group of 15 to 55 onwards, who voluntarily agreed to participate in the study. The respondents were categorized into three age groups range as- 15-35 years, 36-55 years, and above 56 years. Starting from the age of 5 years, each age group is also categorized decade-wise e.g. age group of 56 years and above was divided into six decades starting from the age of five years. The collected data were tabulated and analyzed statistically with the help of approved statistical techniques. The statistical formula used was frequency, mean, and percentage.

III. RESULTS & DISCUSSION

Trends in the occurrence of age-related diseases: Among 56 years and above, the most common age-related disease was hypertension followed by diabetes. During the decade 2001-2010, rural subjects who suffered from diabetes, CHD, HTN, rheumatism/ arthritis were 2.50 percent, 2.50 percent, 7.50 percent and 5 percent respectively, while urban subjects suffering from Diabetes and HTN were 6.25 percent and 11.25 percent respectively. 2011 onwards, the percentage of rural respondents who were diabetic and hypertensive were 7.50 percent and 13.75 percent respectively; while in the urban areas, the percentage suffering from the diabetes, CHD, HTN were 8.75 percent, 2.50 percent and 21.25 percent respectively (Figure 1). According to the report, The Burden of Cardiovascular Diseases among the US States, 1990-2016 (2018), in 2016 in the United States, CVD as a proportion of all DALYs (disability-adjusted life-years) increased with age rapidly after age 40 years, rising to account for 20% of all DALY burden by age 65 years. While in India, cardiovascular diseases contributed 28·1% of the total deaths and 14·1% of the total DALYs

in 2016, compared with 15·2% and 6·9%, respectively, in 1990 [17].
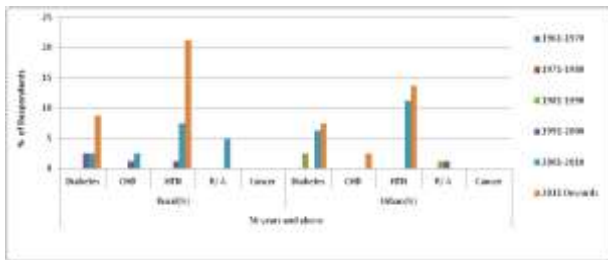

Figure 1: Trends in occurrence of age-related diseases (Above 56 years)

Among the 36-55 years of age group, in the decade 1981-90 and 1991-2000, 1.14 percent of the urban subjects suffered from hypertension (Figure 2).
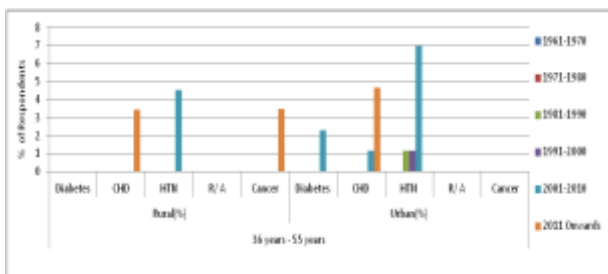

Figure 2: Trends in occurrence of age-related diseases (36-55 years)

During the decade 2001-2010, 4.55 percent of the rural subjects and 6.98 percent of the urban subjects suffered from HTN; 2.27 percent and 1.14 percent of urban population was suffering from diabetes and CHD respectively. 2011 onwards, 3.49 percent of urban and 3.41 percent of rural subjects suffered from diabetes; 3.41 percent of rural and 4.65 percent of urban subjects suffered from HTN. Among 15-35 years of age, only 2.78 percent of urban subjects suffered from HTN from 2011 onwards (Figure 3).
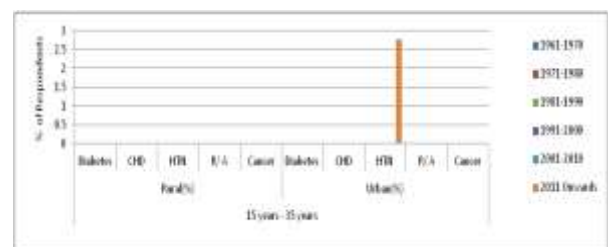

Figure 3: Trends in occurrence of age-related diseases (15-35 years)

Among the population as a whole, the respondents of the age-group 56 years and above experienced the occurrence of HTN in their 40s whereas the occurrence was seen in the 30s among the second age-group of 36-55 years and the third age-group of 15-35 years (Figure 4).
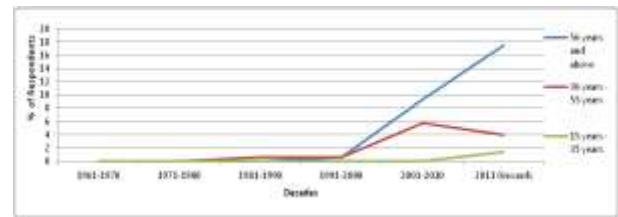

Figure 4: Trends in occurrence of Hypertension

Diabetes is the other emerging point of concern. The rate of occurrence among first two age-groups (36-55 years & 56 years and above) was observed during their 30s (Figure 5).
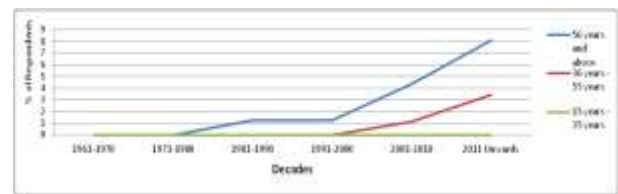

Figure 5: Trends in occurrence of Diabetes

Kodaman N studied Cardiovascular Disease risk factors in Ghana during the rural-to-urban transition and concluded that urban residence was strongly associated with obesity, diabetes, and hypertension. The urban residents showed substantially worse cardiovascular risk profiles [18].

A Study conducted by Andersson C & Vasan RS revealed that young adults (aged 18–45 years) have developed increasingly unhealthy risk factors over the past 2 decades, including obesity, poor diet, and physical inactivity [19]. Also, dietary habits influence many risk factors for cardiometabolic health, including heart disease, stroke, and type 2 diabetes, which collectively pose substantial health and economic burdens [20]. According to Micha R et al., dietary factors were estimated to be associated with a substantial proportion of deaths from heart disease, stroke, and type 2 diabetes [21].

The availability of serial, standardized blood pressure measurements performed in the family-based Framingham Heart Study was utilized by Niiranen TJ et al to investigate the risks associated with early-onset hypertension compared with late onset hypertension in the community and observed that early and not late-onset hypertension in parents predicted incident hypertension in offspring. In turn, the presence of early-onset compared with late-onset hypertension was associated with a greater risk for cardiovascular death [22].

Urbanization is one of the important determinants of non-communicable disease risk. To determine location-based differences in CVD risk factors, Mohan I et al. performed a study in India among women in rural, urban poor and urban middle-class locations. Their study concluded that there is an urbanization-related transition of overweight/obesity,

abdominal obesity, hypertension, hypercholesterolemia, impaired fasting glucose and diabetes. The urban-middle class women have the highest risk compared to urban-poor, and rural [23].

The findings of the present study may be restricted by the social desirability bias. The survey tool i.e. the questionnaire could also pose certain limitations as the dietary recall is dependent on the memory, literacy, and numerical skills of the respondent. Also, due to time constraints, the sample size of this study was restricted and the area of study was limited.

IV.   CONCLUSION

The study showed that the occurrence of age-related diseases, among the age group 56 years and above, was seen after the 40s while in the other two age groups, the occurrence was recorded in the 30s itself. Comparing the third decade, i.e., the 30s of all the three age groups, none of the subjects was suffering from age-related disease among 56 years and above while among 36-55 years of age, 0.57 percent and among 15-35 years of age, 1.35 percent of subjects suffered from hypertension. The occurrence of these diseases was more in the urban areas as compared to rural areas.

As revealed by the study, the younger population is experiencing the early onset of non-communicable diseases. These estimates pose a necessity for government bodies to focus on key factors leading to this trend, improving health care quality, and emphasis a healthy lifestyle. Also, the governmental and non-governmental organizations should gather more comprehensive data on all diseases and prioritize policies for improving quality of life.

Ethics Approval:

The study was survey-based and no intervention was included in this study. Questionnaire related to age-related diseases was used to interview respondents who voluntarily participated. It is in my best knowledge that there is no need for ethical approval for the survey-based study.

REFERENCES

[1] Lozano. R., Naghavi. M., Foreman. K. & et al. (2012). Global and regional mortality from 235 causes of death for 20 age groups in 1990 and 2010: a systematic analysis for the Global Burden of Disease Study 2010.*Lancet,*380(9859),2095-20128. doi.org/10.1016/S0140-6736(12)61728-0

[2] Checkley. W., Ghannem. H., Irazola. V., Kimaiyo. S., Levitt. NS., Miranda. JJ. & et al. (2014). Management of NCD in Low- and Middle-Income Countries. *Global Heart, 9*(4), 431-443. doi.org/10.1016/j.gheart.2014.11.003

[3] Indrayan. A. (2005). Forecasting vascular disease and associated mortality in India. In: Burden of Disease in India. National Commission on National Commission on Macroeconomics and Health, Ministry of Health & Family Welfare, New Delhi, India,197-218.Availble at: http://wwwlive.who.int/entity/macrohealth/action/NCM H_Burden of disease (29 Sep 2005).pdf#page=215

[4] Seigel. KR., Patel. SA. & Ali. MK. (2014). Non-communicable diseases in South Asia: contemporary perspectives.*British Medical Bulletin,* 111(1), 31-44. doi.org/10.1093/bmb/ldu018

[5] Benziger. C.P., Roth. G.A. & Moran. A.E. (2016). The Global Burden of Disease Study and the Preventable Burden of NCD. *Global Heart,* 11(4),393-397. doi.org/10.1016/j.gheart.2016.10.024

[6] Balakumara. P., Maung-U. K. & Jagadeesh. G. (2016). Prevalence and prevention of cardiovascular disease and diabetes mellitus. *Pharmacological Research,* 113(A), 600-609.doi.org/10.1016/j.phrs.2016.09.040

[7] Frasca. D., Blomberg. B.B. & Paganelli. R. (2017). Aging, Obesity, and Inflammatory Age-Related Diseases. *Frontiers in Immunology*, 8,1745. doi.org/10.3389/fimmu.2017.01745

[8] Benjamin. E.J., Blaha. M.J., Chiuve. S.E., Cushman. M., Das. SR Deo. R. & et.al. (2017). Heart Disease and Stroke Statistics—2017 Update: A Report From the American Heart Association, 135, e146–e603. doi.org/10.1161/CIR.0000000000000485

[9] N. Koye. D., Magliano. D.J., Nelson. R.G.& Pavkov. M.E. (2018). Advances in Chronic Kidney Disease. *The Global Epidemiology of Diabetes and Kidney Disease,* 25(2), 121-132. doi.org/10.1053/j.ackd.2017.10.011

[10] Dabelea. D., Stafford. J.M., Mayer-Davis. E.J., Agostino. Jr RD., Dolan. L., Imperatore. G., Linder. G. & et.al. (2017). Association of Type 1 Diabetes vs Type 2 Diabetes Diagnosed During Childhood and Adolescence With Complications During Teenage Years and Young Adulthood. *The Journal of the American Medical Association,* 317(8), 825-835. doi:10.1001/jama.2017.0686

[11] India State-Level Disease Burden Initiative Diabetes Collaborators. (2018). The increasing burden of diabetes and variations among the states of India: the Global Burden Of Disease Study 1990–2016.*Lancet Glob Health,* 6, e1352–1362. doi.org/10.1016/S2214-109X(18)30387-5

[12] Nwankwo. T., Yoon. S.S., Burt. V. & Gu. Q. (2013). Hypertension among adults in the United States:

National Health and Nutrition Examination Survey, 2011-2012. *NCHS Data Brief*, 133,1-8. PMID: 24171916. Available at: https://pubmed.ncbi.nlm.nih.gov/24171916/

[13] Andersson. C., Quiroz. R., Enserro. D., Larson. M.G., Hamburg. N.M., Vita. J.A. & et.al. (2016). Association of Parental Hypertension With Arterial Stiffness in Nonhypertensive Offspring. *Hypertension*, 68:584–589. doi.org/10.1161/HYPERTENSIONAHA.116.07426

[14] Mahmood. F.M. Prevalence and prevention of lifestyle-related diseases in Saudi Arabia. (2018) *International Journal of Health Sci (Qassim)*,12(5), 1–2. PMID: 30202400. Available from: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6124832/

[15] Lim. S.S., Vos. T., Flaxman. A.D. & et al. (2012). A comparative risk assessment of burden of disease and injury attributable to 67 risk factors and risk factor clusters in 21 regions, 1990-2010: a systematic analysis for the Global Burden of Disease Study 2010. *Lancet,* 380(9859), 2224-2260. doi.org/10.1016/S0140-6736(12)61766-8

[16] Murray. C.J., Atkinson. C., Bhalla. K. & et al. (2013). US Burden of Disease Collaborators. The state of US health, 1990-2010: burden of diseases, injuries, and risk factors. *Journal of the American Medical Association*, 310(6), 591-608. doi:10.1001/jama.2013.13805

[17] Global Burden of Cardiovascular Diseases Collaboration. (2018). The Burden of Cardiovascular Diseases Among US States, 1990-2016. *JAMA Cardiol,* 3(5),375– 389. doi:10.1001/jamacardio.2018.0385

[18] India State-Level Disease Burden Initiative CVD Collaborators. (2018). The changing patterns of cardiovascular diseases and their risk factors in the states of India: the Global Burden of Disease Study 1990–2016. *The Lancet Global Healt,* 6(12), e1339-e1351.doi.org/10.1016/S2214-109X(18)30407-8

[19] Kodaman.N., Aldrich. M.C., Sobota. R., Asselbergs. F.W., Poku. K.A., Brown. N.J. & et al. (2016). Cardiovascular Disease Risk Factors in Ghana during the Rural-to-Urban Transition: A Cross-Sectional Study. *PLoS ONE*, 11(10), e0162753. doi.org/10.1371/journal.pone.0162753

[20] Andersson. C., Vasan. R.S. (2018). Epidemiology of cardiovascular disease in young individuals. *Nature Reviews Cardiology*, 15,230–240. doi.org/10.1038/nrcardio.2017.154

[21] Mozaffarian. D. (2016). Dietary and policy priorities for cardiovascular disease, diabetes, and obesity: a comprehensive review. *Circulation*, 133(2), 187-225. doi.org/10.1161/CIRCULATIONAHA.115.018585

[22] Micha.R., Peñalvo. J.L., Cudhea. F., Imamura. F., Rehm. C.D.& Mozaffarian.D.(2017). Association Between Dietary Factors and Mortality From Heart Disease, Stroke, and Type 2 Diabetes in the United States.*The Journal of the American Medical Association*,317(9),912-924. doi:10.1001/jama.2017.0947

[23] Niiranen.T.J., McCabe. E.L., Larson. M.G., Henglin. M., Lakdawala. N.K., Vasan. R.S., Cheng. S. & et al. (2017). Heritability and risks associated with early onset hypertension: multigenerational, prospective analysis in the Framingham Heart Study. *British medical journal,* 357, j1949. doi.org/10.1136/bmj.j1949

[24] Mohan. I., Gupta. R., Misra. A., Sharma. K.K., Agrawal. A., Vikram. N.K. & et al. (2016). Disparities in Prevalence of Cardiometablic Risk Factors in Rural, Urban-Poor, and Urban-Middle Class Women in India. *PLoS ONE*, 11(2), e0149437. doi.org/10.1371/journal.pone.0149437