



NONCOMMUNICABLE DISEASE BURDEN IN KERALA

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ARTICLE INFO

Article History:

Received 19th July, 2017
Received in revised form
05th August, 2017
Accepted 27th September, 2017
Published online 10th October, 2017

Keywords:

Non-Communicable Diseases,
Kerala.

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Citation: Devi Nair. 2017. "Noncommunicable disease burden in kerala", *International Journal of Development Research*, 7, (10), 15846-15850.

ABSTRACT

Chronic noncommunicable diseases (NCDs) have replaced communicable diseases as the most common causes of morbidity and premature mortality worldwide. About 80% of the burden occurs in low and middle-income countries and individuals younger than 60 years. Kerala is facing high risk burden of NCDs than other states in India. NCD risk factors are also high in Kerala. An integrated and comprehensive approach is needed to control the epidemic.

INTRODUCTION

Globally the disease pattern is shifting from communicable diseases to noncommunicable diseases. Latest estimates from Global burden of disease study (GBD, 2015) say that total deaths from noncommunicable diseases (NCDs) are increased by 14.1% (39.8 million to 40.5 million) in 2015. According to WHO global status report 2014 reported that Noncommunicable diseases (NCDs) contribute to around 5.87 million deaths that account for 60 % of all deaths in India (WHO, 2014). Almost three quarters of NCD deaths i.e. 28 million occurs in low and middle income countries and occurs before the age group of 60 (WHO, Fact sheet, 2015). NCDs are driven by forces that include ageing, rapid unplanned urbanization, and the globalization of unhealthy lifestyles. Four main diseases are mostly thought to be dominant in NCD mortality and morbidity: they are cardiovascular diseases (including acute coronary syndrome and stroke), diabetes, cancers and chronic respiratory diseases (including chronic obstructive pulmonary diseases and asthma). Kerala, the south Indian state is in the third stage of epidemiologic and demographic transition offered by low fertility rate and high life expectancy. The state is facing highest prevalence of noncommunicable diseases including cardiac disease, diabetes, cancer, chronic pulmonary disorders and their risk factors (Thankappan et al. 2010, Shah, 2010).

Noncommunicable diseases, especially diabetes, cardiovascular diseases and cancer are common even in rural areas and among younger populations. A large community based study by Thankappan et al revealed that the burden of NCD risk factors is quite high in Kerala, even comparable to that of developed countries. The study showed an increase in the prevalence of all NCD risk factors with age. The study showed hypertension prevalence of 36.2%, the prevalence of smoking 45.2% among men, diabetes prevalence 20.6% and overweight 20.9%. (Thankappan et al, 2010). Another work by the same author for hypertension among rural population in Kerala also reported 36.7% prevalence of hypertension (Thankappan, Sivasankaran et al, 2006). The IDSP risk factor survey reports 26% prevalence of overweight 48% hypertension and 20% of males were smokers in rural Kerala (IDSP, 2008). A recent survey led by Sebastian et al, 2016 among 820 adults in a rural Panachayth in northern Kerala reported the prevalence of high blood pressure was 25.7% and diabetes 21.3% (already diagnosed) and 10.3% of cases had both. 5.7% of subjects had chronic kidney disease already diagnosed, indicating inadequate control of diabetes and high blood pressure. Regarding NCD risk factors, smoking was reported by 37.2% of men, regular alcohol consumption by 2.5% men and low level of physical activity by 17.7% of all (Sebastian et al, 2016). The survey also covers that overweight was more predominant among the upper

socioeconomic class (38.0%) compared to the lower and middle classes (6.5 to 8.8%) whereas below average BMI were observed in 20% of lower class people compared to 1.3% in upper-class. Overweight is more among men compared to women, whereas obesity was observed among 1.4% of women but not among men. Paradoxically, these obese women belonged to the lower classes (Sebastian et al, 2016). Early researchers have observed that in Kerala the prevalence of NCDs and risk factors for non-communicable diseases are very high and it starts early in life compare to other states of the country. Kerala has made significant economic growth and development indicators showing that Kerala is one of the Indian states with the least reported level of poverty. The state made this achievement mainly through Non resident Indians (NRIs) remittance. There are few studies tried to explore the relationship between migration and NCDs. A study in northern part of Kerala reported that the prevalence of NCDs and its risk factors are high among gulf migrants compare to non migrants. Hypertension, obesity and diabetes are significantly high among gulf migrants (Shamim, 2013)

Safraj et al attempted to examine the relationship between a personal history of migration and prevalence of chronic diseases and risk factors in a rural population in Kerala. The consequences are showing that Subjects with an account of migration had a higher prevalence of chronic disease when compared with those with no history of migration. Diabetes (19.6% versus 4.1%), hypertension (18.8% versus 6.6%), and cardiac complaints (8.6% versus 4.1%) are more prevalent among those with a history of migration of over 5 years (Safraj Shahul Hameed, Kutty. V. R et al, 2013). NCD mortality and its risk factors are high among tribal population also. Prevalence of NCDs is higher among tribal population also. A study by Priyanka on Kani tribal groups says that Prevalence of hypertension was higher (48.3%) among Kani tribe when compared to general population. Other significant NCD risk factors were overall consumption of any form of tobacco (81.5%), alcohol use (36.2%), abdominal obesity (22.1%), overweight (10.7%) and insufficient consumption of fruits or vegetables (100%). As per the study report almost one third (28.2%) of Kani tribes were found to have high combined risk score for NCDs (Priyanka, 2014).

In Kerala Non communicable risk factors are high among adolescents especially among students. A study conducted among college students (medical) in northern part of Kerala reporting that lack of exercise — 44.6%, junk food intake more than 3 times per week — 65.9%, extra salt intake — 78.5%, daily smokers — 2.4%, and alcohol consumption in the past 30 days of the survey was 2.5%. Around 30% of the students were found to be undernourished, whereas 9.8% were preobese/obese (Imaad Mohammed Ismail et al, 2016). The mortality and morbidity related to four major NCDs cardiac diseases, diabetes, cancer and COPD are given below.

Cardiac Diseases

Kerala is the south Indian state with a high burden of cardiovascular disease (Kutty V.R et al, 1993) and there is no significant difference in the prevalence of cardiovascular risk factors in the urban and rural populations in Kerala (Thankappan et al, 2010). A recent study by Ashlesh et al, 2016 in Kannur district reported Hypercholesterolemia was found in 63.8% of the participants and the prevalence was more than the worldwide average of 39% reported by WHO (Ashlesh OP et al, 2016). Hypercholesterolemia was found to

be more prevalent in women, in those with high BMI (23.5–24.9 kg/m²) and in those with blood pressure \geq 140/90 mmHg. A similar connection with female gender, high BMI and high blood pressure was considered in the ICMR–INDIAB (India Diabetes) study also. Only the recent survey NFHS 4 reported that Kerala has just 16.3% hypertensive patients, which is below the national average of 22.2% (NFHS 4, 2015-16). A recent work by Sebastian et al reported prevalence of high blood pressure was 25.7% (Sebastian et al 2016) in rural Kerala. A 5 years retrospective study conducted on hospitalized patients admitted with cardiovascular diseases by Celine et al, 2014 reported, out of 10427 cases, 6324 (60.65%) were males and 4103 (39.35%) females. Cardiovascular disease was more among males than females. It was more occurred in \geq 60 years. Ischemic heart disease was more among males than females. Total 797 deaths due to cardiovascular disease were reported and (65.87%) were males and (34.13%) were females. Case fatality due to cardiovascular diseases was 7.64%. Case fatality among males (8.3%) were more than females (6.63%) (Celine, 2014).

A five year follow up study in Kerala reported that out of 4271 deaths recorded during 5 years circulatory system failures were 40%, coronary system diseases were the leading cause of death in men (31.1%) and women (17.6%). Age standardized cardiovascular death (CVD) rates were 490 for men, 231 for women /100000 person years. The survey concluded that CVD deaths in Kerala now exceed three to half a dozen times that of industrialized nations like Japan and China (CADI report). According to Cardio logical registry the average age of a first heart attack fell by at least 10 years in Kerala, in abrupt contrast to a 20 year increase in many western states. In the 1960s and 70s, heart attack in the very young (before the age of 40) was very uncommon in Kerala. The heart attack rate among men in this age group increased 40-fold by 1990 with at least 20% heart attacks occurring before age 40 and 50 (Lancet, 2008). The high rates of premature heart disease in Kerala also result in a high economic burden, as high as 20% of its state domestic product (Mahal. A, 2010). Hospitalization for a heart attack results in catastrophic health spending in more than 60% of higher income and more than 80% of low income Keralans with 50% of these requiring distress financings (Mahal. A, Sivakumar, 2011).

Mohan et al in his study say that the prevalence of heart disease in rural Kerala is 7%, which is nearly double that of northern India and parallel the high levels of cholesterol in Kerala (Mohan et al., 2001). Based on various epidemiological studies in different states of India, Kerala reported the highest ratio of coronary artery diseases (rural 7.5%- urban 12%) (Kutty, 1993). There was twenty fold increases in the number of acute myocardial infarctions in a single medical college in Kerala during 1966-1988. Based on surveys of Council of Medical Research (ICMR and WHO) and Cardio logical Society of India's Kerala Chapter reported that on an average 110 people drop dead of heart disease in Kerala every day."Extrapolating the study data, it can be surmised that at least 38,000 people die of heart attack in Kerala every year, while some 1.5 lakh people develop heart disease in Kerala each year (ICMR 2008). A recent study in Kerala by Krishnan et al described the prevalence of coronary artery disease in Kerala increased nearly three times since 1993 without any difference in urban and rural regions.

Most risk factors of Coronary artery disease were extremely prevalent in the state (Krishnan et al, 2016). The same author report on his study of coronary artery disease (CAD) in Kerala, Age-adjusted prevalence of CAD (any and definite) was significantly higher in participants >45 years ($p < 0.001$). The prevalence of any CAD was significantly higher in rural women (15.6 %) as compared to urban women (11.7 %) (Krishnan et al, 2016). A recent study in Thiruvananthapuram dist, Kerala that shows an uptick in the number of patients suffering from heart diseases, cancer and hypertension in the coastal belt. Granting to the survey, more than a fourth (25.9 percent) were considered to be hypertensive and one-fifth (20.4 per cent) reported to suffer diabetes. It was also found that more than 50 per cent of the people above 65 were hypertensive (Malayala Manorama daily, report, 2016)

Diabetes

Kerala is the diabetes capital of India with a prevalence of diabetes as high as 32.9% compare to the national average of 20.3 % (NFHS 4, 2016). The survey reported more diabetes in men and in urban regions. About 11% of people were affected with high diabetes. According to the latest report of Kerala health services, one in third is becoming diabetic in Kerala and 33.39% of the total population of Kerala is suffering with diabetes. According to available data every month around 87000 new cases are reported. The number of women is equally at risk in Kerala (Kerala health services report, 2016). Earlier in a large multi-centre study involving almost 20,000 subjects, the prevalence of diabetes in Thiruvananthapuram was 17% compared to 15% in Hyderabad and New Delhi, 4% in Nagpur and 3% in Dibrugarh (Mohan, 2006). Various works from different regions of Kerala support the high prevalence of diabetes. One study from central Kerala reported a prevalence of diabetes by 20% and prediabetic 11% (Menon, 2006). The study says that the high literacy in Kerala is not leading high health literacy. The high prevalence of diabetes is accompanied by poor detection in the same study; surprisingly only 11% (55% of all diabetes) were newly diagnosed.

Some other work from southern Kerala, established a wide urban-rural gradient in age-standardized (30-64 years) prevalence of diabetes indicating an important function of lifestyle factors. The prevalence was 17% in urban, 10% in the Midlands, 7% in the highland, and 4% in the coastal regions (Kutty VR, 2000). Socio economic status and relation with NCDs are always in debate on low and middle income countries. A study by Safarj, 2012 says that the proportion of self-reported diabetes was highest (at 11.1%) in the group with the highest socioeconomic status, when compared with 3.1% in lower socioeconomic position. The trend was similar in both genders. The prevalence of self-reported diabetes increases as one moves up the socioeconomic ladder in this rural community (Safaraj et al, 2012). The Epidemiology of Noncommunicable Diseases in Rural Areas (ENDIRA) study by Menon et al, 2015 reported Compared with those above the poverty line (APL); the BPL group was less likely to have diabetes, hypertension or dyslipidaemia (Menon, 2015).

Earlier works have established a prevalence of 11-19% in men and 15-22% in women with rural Keralans having paradoxically higher rates of diabetes than urban dwellers (Kerala Paradox). This is in sharp contrast to national data that shows the prevalence of diabetes to be double in urban areas than rural areas (Thankappan, 2010, Shah, 2010).

A study of Menon et al, 2008 reported the control rates of diabetes are still poor, which could contribute to an increment in the burden of cardiovascular disease (CVD)—the foremost killer of people with diabetes (Menon, 2008). Among those with diagnosed diabetes, 17% received no treatment, 15% were on diet alone, the same survey reported only 40% of people with diabetes had adequate control of blood sugar level. Earlier studies say that only one fifth of the diabetics are treated and adequately controlled. The high prevalence, poor detection and control of diabetes in Kerala contradictory to the highest standards of health care and literacy level compared to other states of India makes this disease vulnerable to many.

Cancer

As per Cancer registry, 2014 data, in Kerala there are 974 female cancer and 913 male cancer patients per million. In one year, Kerala has roughly 35,000 new cancer cases occurs. In this 50% of malignant neoplastic diseases are in the throat, mouth and lungs in male & 15% in women caused by tobacco and alcohol habits. In reality, in Kerala overall tobacco is responsible for 50% and diet for 10-20% of malignant neoplastic diseases (Cancer registry, 2014). Among male cancer of the lung was the leading site in all 14 districts of Kerala except Thiruvananthapuram where it is cancer mouth. Malignant neoplastic disease of lung constitutes 12-14% of all cancers in males in all other territories. However, cancer, stomach was the second leading site in northern parts Thrissur, Palakkadu and Kannur. In Kasarkode and Ernakulum districts cancer, stomach was the 4th and the 7th leading site respectively. Non-Hodgkin's lymphoma was the second leading in Ernakulum and 3rd in Kasarkode. In males Thiruvananthapuram have the highest incidence rate of mouth cancer among the world (Cancer registry report).

Among female, cancer, breast was the leading sites in all districts. Thyroid cancer reported second frequent cancer in Kannur and Ernakulum. There also seems to be a belt of thyroid cancers among women in Kerala, along to west coast of Karnataka, and Goa. Economic review 2013 reported every year 35000 new cancer patients were seeking care in Kerala (Economic review, 2013) and a regional cancer centre report says that there is a 280 % increase in cancer cases in Kerala within three decades, based on the cancer registry data. A total of 100,000 cancer patients are in prevalence annually in the state. A recent report from Kerala is that there is a 25 % increase in lung cancer cases in the metro city of Cochin. The report says 67% lung cancer patients are male and 5% belongs to younger age groups (Malayala Manorama daily report, 8/11/2016).

Chronic Lung Diseases

Respiratory diseases are a substantial causal agent of mortality worldwide. In India, as per data from Special Survey of Deaths (SSD, 2001-2003), carried out under the domain of Sample Registration System, which covered over 6,645 small areas in all the States and Union Territories, the leading cause of death in the age group above 20 years was cardiovascular disease (25%), followed by respiratory diseases (20%)—namely COPD, asthma and tuberculosis. As per data from the Central Bureau of Health Intelligence, India deaths due to respiratory causes raised up to 17.2% in 1998, this was 14.4% in 1993. Bronchitis, asthma, pneumonia and TB of the lungs were ranked as the leading causes of deaths in rural India.

Rank-wise distribution of all diseases during 1971-1991, asthma and bronchitis was a leading cause in the three decades, accounting about 9-11% of all deaths. TB was the third most killer during this time, which constitute about 5-6% of all deaths (CBHI, 1993-98). Limited studies on state regarding mortality and morbidity related to respiratory diseases in Kerala or the determinants of respiratory mortality in Kerala are available. A Study of *Jinadal*. S. K, 2010 reported 10.1% bronchitis and 3.1% chronic asthma in Kerala compared to the national average of 3.5% and 1.9% respectively (*Jinadal*, 2010). Another study done by *Nair et al 2014*, a total of 3467 deaths were reported among 77881 subjects above the age group of 20 years during the follow-up period. Of which 531 (15.9%) were due to respiratory causes.

Majority of respiratory deaths (80.6%) occurred above the age of 60 years ($P < 0.001$). The proportion of deaths among males and females were comparable in both groups ($P > 0.05$). The majority of respiratory deaths occurred in subjects with a lower educational status that is equal to and < 10 years of schooling (98%). Respiratory mortality seemed to be higher among subjects belonging to the lower socioeconomic strata (55.34%). The proportion of smokers were higher in those with respiratory mortality ($P < 0.001$). In the study bivariate analysis showed the factors such as older age (> 60 years), lower educational status (≤ 10 years of schooling), lower socioeconomic status and smoking were found to be significantly associated with the respiratory mortality (S. Nair et al, 2014). Another study done *J. Menon et al 2016* tried to establish the relationship between socioeconomic status and COPD. In that study COPD has seen more among men and in below poverty line (BPL) status (J. Menon, 2016).

Conclusion

Noncommunicable diseases constitute a major public health challenge that undermines social and economic development in India. Kerala state is facing high burden of noncommunicable diseases, and its risk factors. The prevalence of NCDs especially cardiac problems, diabetes all forms of cancers and chronic respiratory diseases are significantly high in Kerala. An integrated and comprehensive approach is needed that gives emphasis on health promotion, early detection, population-based interventions, prevention of exposure to risk factors, and strengthening of health system towards universal access to health services.

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