

Indian giant leap towards Hypertension: A short comparison and discussion

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Abstract

South Africa is the leading country in terms of hypertension (HTN) patients, but the gradual metamorphosis of India towards World capital of HTN is a rude fact. If yearly increase in the percentage of HTN subjects is concerned, India can possibly topple South Africa and other countries in near future. The yearly HTN percentage data of different areas of India is compared with that of South Africa and the USA. Primary data taken from the Happy Valley tea garden, Darjeeling, India is compared to find trend of HTN in rural industrial areas of India. Yearly increment rate of HTN in India is found to be highly alarming, while that in the USA and South Africa is found slow and almost stagnant. Again South Africa, having highest HTN subjects till date, is found to be successful to check HTN at present. This work, probably for the first time, also highlights the effect of HTN in industrial and agricultural area of India exploring the alarming situation. This work also indicates that contrary to our general belief, the poorer people may also face HTN.

Keywords: Hypertension, Happy Valley tea garden, India, USA, South Africa.

1. Introduction

Hypertension (HTN), a form of non-communicable disease, is defined as a chronic condition of concern due to its role in the causation of coronary heart disease, stroke and other vascular complications. In 90% of all the HTN cases, the accurate reasons remain unknown. Medical science can only predict the inherent reasons and possible remedies for the rest 10% cases [1]. Recent analysis [2] has shown that the HTN is mostly prevalent in low and middle income countries and South Africa is leading the way. But this study reveals the fact that if yearly trend of HTN is considered, India is in highly dangerous situation and probably in future it will overtake South Africa to become the capital of HTN. In this work existing data of yearly variation of HTN

of different Indian cities are used and compared with South African HTN subjects. Corresponding data of the USA [3] is also compared in this same study. It is found that the increase of the percentage of HTN subjects has come to a halt from the very beginning of nineties, while South Africa has been successful to check the rapid spread of HTN in recent years. But, unfortunately, in Indian cities the rapid exponential growth of HTN subjects is alarming and the data is showing lack of awareness and prevention.

Here, probably for the first time the trend of HTN in an Indian tea garden industry is also collected and compared with other existing data of India and abroad. This is done to understand that not only urban India but also rural India is facing the severe damages due to HTN.

2. Materials and Methods

In this study the data from existing literature are used to estimate the yearly trend of HTN at North India, South India [4,5] and Mumbai [6,7,8]. South African data is collected from the website <http://indicators.hst.org.za/healthstats/41/data> [9].

The study area of this work is related to the Happy Valley Tea Garden, Darjeeling, India which is situated from 27°13' N to 26°27' N Latitude and from 88°53' E to 87°59'E Longitude. Presently, there are almost 86 gardens operating in Darjeeling with almost 52000 workers, Happy Valley is perhaps most famous of them.

In a recent work [10] the invasion of hypertension in the study area is described. From the year 2010 to 2013 onwards, every year 157 same tea garden workers were interviewed out of 330 total worker population and their blood pressures (both Systolic and Diastolic) were measured. But after the death of one tea garden worker in 2013, the data of blood pressures could only be collected from the rest of 156 tea garden workers.

3. Results and Discussion

Here hypertension is defined as systolic blood pressure greater than 140 mm of Hg. and diastolic pressure less than 80 mm of Hg (JNC-VII [11] criteria) or any person taking HTN medication. The trend of HTN for different places is shown in Fig. 1. The red filled circles show the yearly data of North India and blue circles represent that of South India. The black circles show the data of Mumbai. At Mumbai, within 25 years (1980-2004) the number of HTN has been tripled. In case of North and South India, the number has been doubled within 10 years. In all the cases, the trend of HTN subjects was found to be still increasing with year. In 2004, the percentage of HTN at Mumbai was 48. The data of study area is shown using red star marks. The HTN percentage was 47 in 2010 and within five years it has reached up to 50%. The data of the USA [1] is shown by green circles. The rate of increase in HTN is very slow in the USA (within 15 years it has reached from 29% to only 32%).

South Africa, the paradise of hypertension is also compared in the same plot (using pink circles). It corroborates its "paradise" title due to the rapid increase in HTN from 23% to 69% (from 1999 to 2007). But thereafter gradually the number has been decreased and it was only 32% in the year 2010. In the same graph, lines are also drawn along with filled circles for convenience to understand the trend of the data.

The data of Mumbai, North India and the study area are fitted with both the linear ($y = a + b \times \text{year}$) and exponential functions ($a e^{b[\text{year}]}$). The data are well predicted by the exponential function rather than the linear fit as shown in table 1. In case of the USA, the reverse finding becomes true as the data is well predicted using linear function (table 1) and this is obvious as the time rate of change here is much slower than the data of India.

The study area of this work belongs to the tea garden workers of India. The recent closures of sick tea gardens, present political turmoil, and bad economical conditions could have added to the woes of tea garden workers and as a result it is found that the percentage of HTN in the year 2010 is very high and this is almost similar to the percentage of HTN in an A1 city like Mumbai for the earlier year 2004.

Perhaps the study area is following the trend of developed Indian cities and in the future the study area may compete with them in terms of HTN. The higher economic status, changing life style and food habit, the stiff competition and rat race in professional arena are the main factors to contribute HTN at developed Indian cities. In the study area the worse economical conditions, lack of good quality food and life style, lack of education contributed HTN. Therefore it can be inferred that the poor and uneducated people, especially from third world countries like India, also face very high possibility of getting attacked by HTN and suffer from its menace. The effect of socio-economic differences in a society on Hypertension has rarely been examined [2,12] but needs to be discussed in detail. In a recent work [10] the invasion of hypertension in the study area is described. From the year 2010 to 2013 onwards, every year about 157 of the tea garden workers were interviewed out of 330 total worker population and their blood pressures (both Systolic and Diastolic) were measured. But after the death of one tea garden worker in 2013, the data of blood pressures could only be collected from the rest of 156 tea garden workers.

Due to good control and medication, the increment in HTN has been checked in high income countries like the USA, which is evident from the trend. Even in South Africa the rapid rate is checked by increasing awareness, control and medication whereas the situation in India is getting worse. This study will be improved if more and more recent data from Indian cities are collected along with data from areas of lesser economic affluence.

3. Conclusion

The exponential growth of HTN in India, not only in developed modern cities but also in industrial and agricultural belts like the study area, indicates that if proper treatment is not done and awareness has not been raised India will soon be turned into a country with human carcasses due to invasion of HTN and its related diseases like diabetes, cardio-vascular disease, stroke etc. The study corroborates the fact that if proper steps are not taken India will become the capital of HTN within the year 2020. South Africa is presently the pioneering country in terms of HTN patients. But if yearly variation of HTN is taken into account, India should topple South Africa in future, if the rate of growth is kept same. While countries like the USA and South Africa have checked the progress of this disease, no initiative has been taken in this country. Not only economically developed modern A1 cities of India are facing problems of HTN, economically less affluent places are also not much far behind. The study area of Darjeeling Happy

Valley tea garden emphatically supports this conclusion.

Table 1: The quality of fitting (exponential and linear) at 4 different places (r^2 =correlation coefficients)

Place	Fit quality	$Y=ae^{-bx}$	$Y=a+bx$
Mumbai	r^2	0.97	0.91
North India	r^2	0.78	0.70
Study area	r^2	0.93	0.92
USA	r^2	0.89	0.93

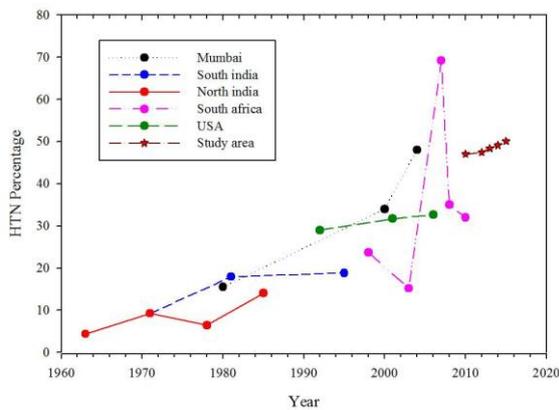


Fig. 1 The yearly variation of HTN subjects (in percentage) at different places.

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