

ORIGINAL RESEARCH ARTICLE

Tuberculosis Prevalence and DOTS Strategy- Analytical Study Based On a Survey in Goa

R.V.KENY*, R.K.SHIRODKAR, B.C.DAS, SANYOGEETA ANDHALE

18th June Road, Goa College of Pharmacy, Panaji-Goa

Received 12 Sep 2010; Revised 29 Sep 2010; Accepted 4 Oct 2010

ABSTRACT

Tuberculosis (TB) continues to be one of the leading causes of morbidity and mortality in India. This study is based on the survey carried out from the calendar years 2006 to 2008 in Goa with the objective of finding out the year wise number of patients registered at the TB centers, the prevalence of bacteriologically positive and radiologically active pulmonary tuberculosis, and to estimate the prevalence of this disease. The information obtained on the epidemiology of tuberculosis helped to underpin the outcome of the therapy. The state of Goa is divided into four Tuberculosis Units (TU) and the data collection was done quarter wise from the respective TU. The percentage of New Smear Positive (NSP) PTB cases was calculated and reported as the NSP Conversion Rate. The year 2006 saw an 85% Rate in the 3rd Quarter. This conversion rate rose to 91% in the 2nd Quarter in 2007 and maintained to 92% by the 4th Quarter of 2008. The Cure rate for new smear positive patients was noted. It increased from 71.5% on an average in the year 2006 to 78% in the following year of 2007 and to a maximum of 80% in the 2nd Quarter of 2008. On an average, the years 2006, 2007 and 2008 showed a death rate of 4.32%, 4.67% and 3.95% respectively. Thus, the years of meticulously planned and painstaking research generated the evidence for change of policy for tackling the tuberculosis problem through the Directly Observed Therapy Short-course (DOTS) strategy and tuberculosis management has been a total success in Goa.

KEYWORDS: Tuberculosis, DOTS, RNTCP, Sputum Positive- Negative, Default rate, NSP Conversion Rate

INTRODUCTION

Tuberculosis (TB) continues to be one of the leading causes of morbidity and mortality in India. The drugs currently in use, given in combination regimens, revolutionized the management and prognosis of TB patients. The situation further brightened with introduction and expansion of the directly observed therapy short-course (DOTS) strategy, but not before years of meticulously planned and painstaking

research generated the evidence for change of policy and practice.

Ideas for good health research and policy interventions, it is said, are born out of good observation. India's cultural and geographical diversity does not lend itself to tailor made remedies. The studies from the Old Portuguese maritime state of Goa do however confirm to trends noted elsewhere in the country.

MATERIAL AND METHODS

Study Area and Population:

Goa is bound on the North by the Sindhudurg district of Maharashtra state, on the West by the Arabian Sea, on the South by Karwar district of Karnataka state and on the East by Belgaum district of Karnataka state. It has a land area of 3702 Sq. Kms and a coast line of 104

Kms. For administrative purposes Goa is divided into two districts- North Goa and South Goa with headquarters at Panaji and Margao respectively together with six divisions and further sub-divided into 11-talukas.

Goa's total population is around 15, 69,793 (2001 census of India). The density of population is 316

per sq.Kms. Most of Goa's population is rural (690,041), a significant population is however urban (479,752). (FIGURE1)

ILLUSTRATIONS

Figure1:-



Sampling Method:

A state wide prevalence survey to estimate the annual risk of tuberculous infection (ARI) in different parts of Goa was carried out from the year 2006-2008. The Revised National Tuberculosis Control Program (RNTCP) has been operational in Goa since September 2004. The survey was carried out in collaboration with the Goa State Tuberculosis Control Society.

Goa is divided into four Tuberculosis Units, namely the Panaji, Ponda, Margao and Curcholem Tuberculosis Units. Every Tuberculosis Unit (TU) caters to an approximate 5, 00,000 population and one Designated Microscopy Centre (DMC) is set up for every 1, 00,000 population. The patients were registered on a daily basis at the respective TU and were assigned with a specific TB number. The data collection for the survey was done quarter wise. Each year was divided into 4 quarters and each quarter consisted of three months. Hence the 1st quarter was from January to March, 2nd Quarter was from April-June, 3rd Quarter consisted of patients registered from July-September and the 4th Quarter from October-December.

Microbiological information, including the smear detection reports, pulmonary and extra-pulmonary data was matched by the age, sex and geographical area where the individual patient resides. Cases were further subdivided into sputum positive and sputum negative

cases. This was decided by the three sputum samples from every individual, which are collected preferably within two days of his/her registration and examined by microscopy at the RNTCP Designated Microscopy Centre. Cough for more than or equal to three weeks reported by the patient makes him/her liable to the sputum examination.

Comparison was carried out between the data obtained for all three years to estimate the New Sputum Positive (NSP) Conversion rate, Cure rate, Success rate, Default rate and the Death rate for the respective quarters.

RESULTS

According to the survey the total number of patients registered for the year 2006, 2007 and 2008 were 2155, 2180 and 2103 respectively. The estimate of the total number of patients was obtained from the respective Tuberculosis Units every quarter which took into account the notifications of every patient registered in that quarter.

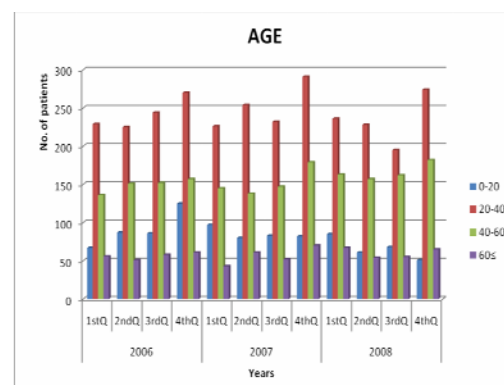
The laboratory reports of the TB isolates were also obtained and matched with that of the respective patients.

Age:

In the year 2006, maximum number of patients registered were from the age group of 20-40 years (44.98%) then followed by the 40-60(27.75%) and 0-20(16.74%) age groups. The least number of patients were from the age group of ≥60(10.52%).

Similar trends were noticed in the year 2007 and 2008 wherein 45.95% and 44.23% patients were found in the age group of 20-40 years followed by the 40-60 and 0-20 age groups with 27.9%, 31.6% and 15.8%, 12.6% respectively. Patients in the age group of ≥60 years were 10.3% and 11.4% in 2007 and 2008 respectively. (FIGURE2)

Figure2:-

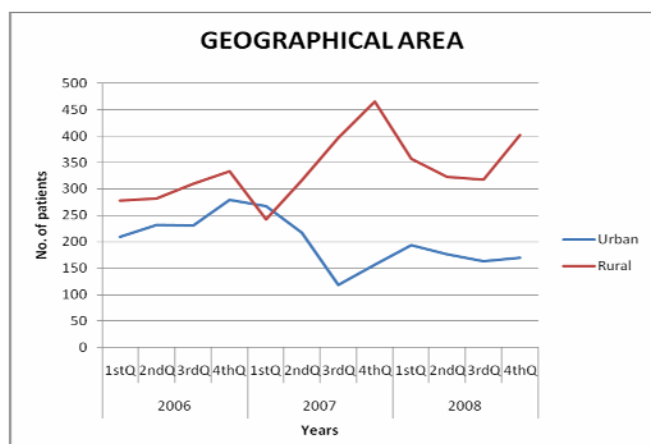


Geographical Area:

According to the trend noticed in the year 2006, there was a marginal difference in the percentage of patients suffering from tuberculosis from the urban and rural area. The Urban population accounted to 44.12% of the cases registered whereas the rural area depicted 55.88% of the patients.

However the trends changed drastically in the year 2007 wherein the urban and rural figures were 35.34% and 65.66% respectively. Similar trends were followed in the year 2008 with an output of 33.57% and 66.43% for the urban and rural areas respectively. (FIGURE3)

Figure3:-

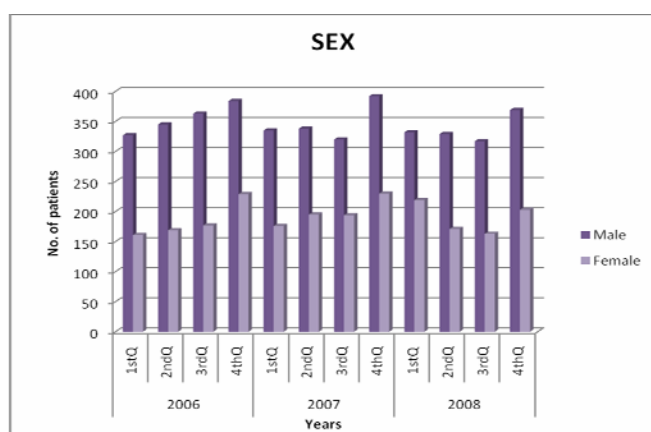


Sex:

It was clearly noticed in all the three yrs of the survey that tuberculosis is more prevalent in the male population than in the female counterparts.

In the year 2006, 2007 and 2008 the male patients were calculated to be 66%, 63.56% and 64.15% whereas the female counterparts represented 34%, 36.44% and 35.88% respectively. (FIGURE4)

Figure4:-



New and Retreatment Cases:

On compiling the data of all the quarters of 2006, it was observed that the newly registered cases were 80.14% in comparison to 19.86% cases for retreatment. Similar trends were noticed in the year 2007 and 2008 with 80.83% and 79.36% cases registered as new patients and 19.17% and 20.46% as retreatment cases respectively. (FIGURE5)

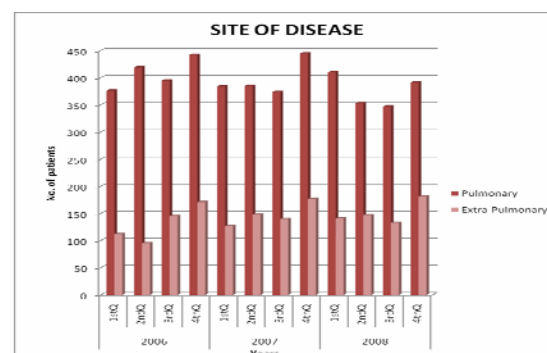
Figure5:-



Site of disease:

The trends all over India and surveys conducted suggest a high rate of incidences of smear positive pulmonary tuberculosis as compared to extra pulmonary tuberculosis. This fact is reiterated by the data obtained from this survey. In 2006, 74.95% patients with pulmonary tuberculosis and 24.05% patients with extra-pulmonary tuberculosis were reported. The following year of 2007 saw 72.92% and 27.08% patients in the pulmonary and extra-pulmonary category respectively. Trends similar to 2007 were noticed in 2008 also, with a population of patients equal to 71.41% registered for pulmonary tuberculosis and 28.59% for extra-pulmonary tuberculosis. (FIGURE6)

Figure6:-



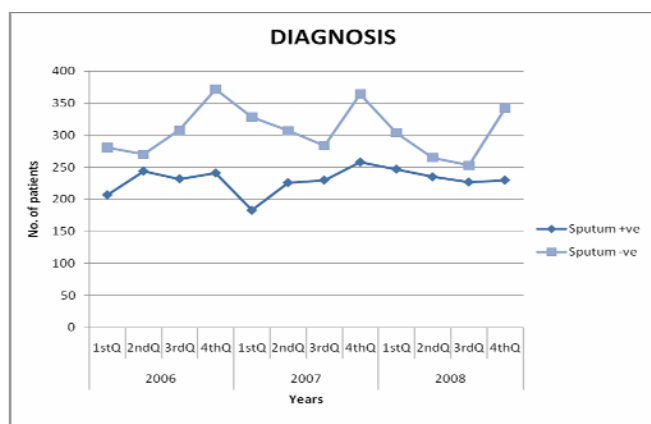
Diagnosis:

A person with at least two positive sputum samples out of the three was confirmed as a case of sputum positive pulmonary tuberculosis.

From the data collected for the year 2006, 43.04% patients were tested as sputum smear positive and 56.96% patients were tested negative. The proceeding years also showed similar trends.

In 2007, 41.11% and 58.89% patients were reported with smear positive and smear negative cases respectively. The year 2008 represented a percentage of 44.83% and 55.17% for the sputum smear positive and sputum smear negative cases respectively. (FIGURE7)

Figure7:-



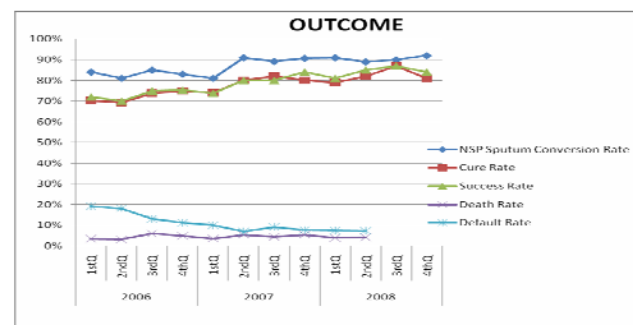
Outcome of the treatment:

The percentage of New Smear Positive (NSP) PTB cases that were smear negative after two months of anti-TB treatment was calculated and reported as the NSP Conversion Rate. The year 2006 on an average saw an 85% rate in the 3rd Quarter. This Conversion rate rose to a whopping 91% in the 2nd Quarter of the year 2007 and maintained to 92% by the 4th Quarter of 2008. This shows how successfully the program is being implemented.

The Cure rate for new smear positive patients was noted. It increased from 71.5% on an average in the year 2006 to 78% in the following year of 2007. The Cure Rate reached a maximum of 80% in the 2nd Quarter of 2008. Thorough monitoring along with good quality diagnosis and good quality drugs has helped in achieving a rate of 80%. The Success rate as observed has increased hand in hand to that of the cure rate. The year 2006 saw a success rate of 73% that increased by

approximately 6% in the following year of 2007 and reached 79.5%. This rate was then maintained till the 2nd Quarter of 2008 with a success rate of 79%.

The Death rate was calculated on the basis of the information of the patients, who died during the course of the treatment. On an average, the years 2006, 2007 and 2008 showed a death rate of 4.32%, 4.67% and 3.95% respectively. Still it becomes very important on the part of the authorities to safeguard the lives of these patients and necessary steps are being taken to bring down the death rate. The default rate (“default” under RNTCP is a patient who has not taken anti-TB drugs for 2 months or more consecutively after starting treatment) saw a drastic fall from 19.2% in the 1st Quarter of 2006 to 6.9% in the 2nd Quarter of 2007 and was maintained at 7.3% till the 2nd Quarter of 2008. The default rate on the other hand has shown a commendable fall and depicts how well the tuberculosis society is working towards educating the patients to complete their treatment. (FIGURES)



DISCUSSION

The number of reported cases of tuberculosis in the year 2006, 2007 and 2008 depicted a stable graph. It was noticed that maximum number of patients registered belonged primarily to the age group of 20-40 years in all the three years. It should be noted that this is the class interval in the population that is more outgoing and is considered as the working group. The people from the age group of 20-40 years come in contact with various conditions in the environment and also belong to the economically productive age group. The patients belonging to the age groups of 0-20 years and ≥60 years were the groups that were least affected by this disease.

This is of great relevance against the backdrop of increasing HIV sero-prevalence in the same age group. The finding confirms that the economic loss due to TB morbidity can be very significant. Hence the population belonging to the age group of 20-40 years should be educated more towards better hygiene and good eating habits to keep themselves healthier. The youth should be warned against the consequences of habits like smoking and drinking also.

The geographical pattern of tuberculosis from the survey reflects the distribution of some high risk population subgroups. In 2006 the patient population saw a marginal difference in the urban and rural areas. The year 2007 saw a drastic rise in the rural population afflicted by the disease. The proceeding year of 2008 also depicted similar trends. This basically reflects the way of socio economic conditions and the effect of poverty on the health profile of the rural population. Most of the mining areas in Goa lie in close proximity to the rural areas. According to the surveys conducted on the incidences of respiratory disorders in the population residing close to the mining areas, the fact that the rural population suffers a greater risk of tuberculosis, is reiterated. Tuberculosis services should be decentralized and measures taken to convince and alert people about tuberculosis and its grave consequences irrespective of geographical barriers.

The distribution with regards to sex shows us that the male population had a higher representation than the female counterpart in the disease. This suggests that more male patients have been observed to visit the tuberculosis units. This can also mean that male patients take action better than females or it also appears that more males are affected with TB. The male population would also be more vulnerable to the disease as the extent of smoking and drinking is more prevalent in the male population. The results also depict that more male patients are able to travel to DTC in comparison with females, may be for various reasons.

The results regarding the new cases and the retreatment cases were also observed. The results help us conclude that the patients are aware of the services available and more

number of new cases are registered each year. It also shows that people have learnt to demand and to fulfill their rights to access good quality tuberculosis services. The low incidence of retreatment among patients depicts the success of the intensive TB program, however there should be more means to attract media attention, disseminate useful information to generate public awareness on tuberculosis and help allay the retreatment cases. The migrant population has increased in Goa in the recent years. Construction sites are on a rise. Most of these migrants are laborers who work on these construction sites. The work conditions and the poor hygiene make this group of population highly vulnerable to the disease. This could also be another reason for the rise in the new cases that have been registered.

As has been depicted in many earlier national surveys, pulmonary tuberculosis is more prevalent in India than extra pulmonary. The disease in all the three years was pulmonary in origin than extra-pulmonary in most of the cases. It is clear from the result that tuberculosis is easy to spread through droplet infection. The findings indicate a high rate of transmission of tuberculous infection in the community and suggest further intensification of tuberculosis control measures, especially in rural areas. The detection should be done faster as the spread should be controlled. Effective treatment will help in controlling the spread of this disease.

Although the cases reported for pulmonary tuberculosis were higher, the proportion of patients with a positive sputum smear has been low throughout the period of the survey for three years. Up to date screening, diagnostic and identification techniques and prompt treatment of all the patients have to be an integral part of the strategy to detect, control and cure tuberculosis. This has been well proved by the strategic means undertaken in the state for the management of TB.

The outcome of the treatment helped in analyzing how effective the therapy and treatment has been throughout the three years. The NSP Conversion Rate showed how successfully the program is being implemented and that stringent activity is being carried out to achieve a 100% Conversion Rate.

The Cure Rate for the new smear positive patients is regarded as the key indicator in high-burden countries. This again has been achieved by thorough monitoring along with good quality diagnosis and good quality drugs has helped in achieving a rate of 80%. But one cannot afford to remain complacent if you are to achieve the targets of the RNTCP i.e. to obtain and maintain at least a golden percentage of 85%. The Success Rate as observed has increased hand in hand to that of the Cure Rate. DOTS providers need to encourage patients to be regular in drug intake and ensure that patients take all drugs in the recommended doses while they keep an eye on the possible side effects also. Commitment with good management practices to ensure adherence to the treatment will further help in maintaining higher success rates.

The Death Rate that showed an increase prior to the survey has neither increased nor decreased in the three years of the survey. Still it becomes very important on the part of the authorities to safeguard the lives of these patients and to take necessary steps and bring down the death rate. The Default rate on the other hand has shown a commendable fall and depicts how well the TB Society is working towards educating the patients to complete

their treatment. Migrant population especially laborers and alcoholism are major constraints in ensuring the completion of DOTS. This is being tackled by intensifying supervision and motivation. Activities are also being geared up by involving local leaders like the Panchayat and the Zilla Parishad members and members of the Legislative Assembly.

CONCLUSION

Like the rest of the country, RNTCP is providing the best anti-tubercular treatment for the patients in Goa. The plan of action is very well organized and therefore performance in achieving a striking 92% NSP Conversion Rate is worth a mention. Efforts are being intensified further to cater to the health needs of the tuberculosis patients and to achieve the desired Cure rate and bring down the Default and Death rate.

Programs like sensitization workshops, training camps and community level awareness programs are being held to improve health education amongst the rural population. The members of the State Tuberculosis Control Society are striving to achieve the millennium development goals related to TB and further control the spread of the disease. TB management in Goa has been a total success.

REFERENCES

1. ICMR; Tuberculosis in India - A Sample Survey 1955-58; Special Report 34. 1959
2. Narain R. Geser A. Jambunathan MV.
3. Subramanian M; Tuberculosis Prevalence Survey in Tumkur district; *Ind. J. Tub.*; 1963, 10, 85
4. Baily GVJ, Savic D, Gothi GD, Naidu VB, Nair SS; Potential yield of pulmonary tuberculosis cases by direct microscopy of sputum in a district of south India: *Bull World Health Orgn.*; 1967, 37. 875
5. Pamra SP. Goyal SS. Mathur GP; Changes in prevalence and incidence of pulmonary tuberculosis in recent years: *Ind.J. Tub.*: 1973.20.57
6. National Tuberculosis Institute; Tuberculosis in a rural population of south India: A five year epidemiological study; *Bull. World Health Organization*: 1974. 51. 473
7. Gothi GD. Narain R, Nair SS. Chakraborty AK, Srikantaramu N; Estimation of prevalence of bacillary tuberculosis on the basis of chest X-ray and/or symptomatic screening, *Ind. J. Med. Res.*: 1976.64. 1150
8. Gopi PG. Vallishayee RS. Appegowda BN, Paramasivan CN. Ranganatha S. Venkataramu K.V, Phaniraj BS. Krishnamacharya L. Devan J, Ponnusamy R. Komaleeswaran G. Prabhakar R; A tuberculosis prevalence survey based on symptoms questioning and sputum examination; *Ind J Tub*, 1997.44. 171
9. Gothi GD. Chakraborty AK. Nair SS. Ganapath; KT. Banerjee GC; Prevalence of tuberculosis in a south Indian district

- twelve years after initial survey ; *Ind J Tub.*: 1979,26. 121
10. Chakraborty AK, Singh II. Srikantan K. Rangaswamy KR, Krishnamurthy MS. Stephen JA; Tuberculosis in a rural population of south India - report on five surveys: *Ind.J. Tub.*; 1982.29. 153
 11. NarangP.NayarS. MendirattaDK.TyagiNKand Jajoo V; Smear and culture positive cases of tuberculosis found among symptomatics surveyed in Wardha district: *Ind J. Tub.*; 1992.39. 159
 12. Goyal SS. Mathur GP. Pamra SP; Tuberculosis trends in an urban community: *Ind J. Tub.*; 1978. 25. 77
 13. Chakraborty AK. Channabasavaiah R, Krishnamoorthy MS. Sashidhara AN. Krishnamoorthy VV. Chaudhari K; Prevalence of pulmonary tuberculosis in a peri-urban community of Bangalore under various methods of population screening: *Ind.J.Tub.*; 1994.41. 17
 14. Chakraborty AK. Suryanarayana HV. Krishnamurthy VV. Krishnamurthy MS. Sashidhara AN: Prevalence of tuberculosis in a rural area by an alternative survey method without prior radiographic screening: *Tuber and Lung Disease*: 1995.76.1

ACKNOWLEDGEMENT

The authors would like to thank the microbiologists, clinicians, and all the other hospital and clinic staff. We are especially grateful to Dr. B. C. Das (Chief Medical Officer- TB Control Program, Goa), Dr. Vandana Dhume (Health Officer- TB Control

Program, Goa) and Dr. Anand R. Savant. We are indebted to the staff and the statistics department of the State Tuberculosis Control Society- Panjim, Goa.