"Analysis of time trends of HIV transmission in coastal South India – Implications for prioritising the strategies for control of HIV"

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Abstract

Introduction: India was supposed to have achieved zero growth of HIV by 2007. As per Millennium Development Goal number 6 target no 7, India should halt HIV spread by 2015 and begin to reverse the spread of HIV/AIDS. Have we been able to contain the spread ? Many strategies are being pursued for control of HIV infection. Are all these strategies relevant for the entire country? So an evaluation of trends of HIV transmission in one of the sentinel sites of medium prevalence South Indian State was undertaken.

Objective: To assess the trends of HIV transmission in Mangalore District of Karnataka State.

Material and Methods: This is a retrospective record based study. Data starting from the year 2001 to the year 2007 (January through April) from all the various centers like VCTC Center, PPTCT Center, STD Clinics, Blood Banks in the entire district was collected.

Analysis: The main outcome measures were the trends of total prevalence, prevalence among the groups (high risk and low risk), location (urban and rural) and gender (males and females). Significance of changes in the prevalence over a period of time was tested with Chi-Square for linear trend. Change in number of cases was correlated (R^2) with time.

Results and Conclusion: The prevalence of HIV increased over period of time among females, rural areas, the high risk groups, though the total prevalence decreased. There is a difference in the epidemiological trends of HIV transmission between the local, state and national level. Area specific differential approaches are needed for control of the HIV epidemics in India.

Introduction

Ever since the first case of HIV was reported from South India in the year 1986, the number of HIV cases have increased. As of now there are an estimated 5.206 million cases of HIV in India with adult prevalence rate of 0.91% [1, 2]. Recent report suggests that these numbers could be over estimation [3]. Irrespective of the actual estimates, control of HIV infection in India is important. As per the 5th five year plan of Government of India, zero growth for HIV should have been achieved by the year 2007 [4]. As per Millennium Development Goal number 6 target no 7, India should halt HIV spread by 2015 and begin to reverse the spread of HIV/AIDS [5]. Many strategies are being undertaken to control the spread of the infection like, Blood Safety program, Targeted Interventions, Sexually Transmitted Diseases Control, Condom Promotion Programme, Prevention of Parent to Child Transmission, Voluntary Counseling and Testing [2]. Are all these strategies appropriate for the entire country? Should there be reprioritization to suit the local needs? Time trends of transmission will help to decide the priorities needed for that area. With this background an analysis of time trends of HIV transmission was undertaken in the coastal district of Mangalore in the state of Karnataka. This district is one of the sentinel surveillance sites of National AIDS Control Organization (NACO) for monitoring HIV transmission in India.

Material and Methods

Study design: Retrospective record based study. Data from the records starting from the year 2001 till April 2007 was collected and analyzed.

Study setting: Mangalore District of Karnataka State

Sources of data: Data was gathered form the following centers in the sentinel site.

1. Voluntary counseling and testing centers (VCTC): All the VCTC s in the entire district of Mangalore (this included 9 VCTCs -- 1 from each of 5 medical colleges, 4 from government hospitals in the district. 4 out of 9 are from urban and remaining 5 from rural areas).

2. Sexually Transmitted Diseases (STD) Clinics: All the STD clinics in the entire district of Mangalore. This included totally 5 STD Clinics (situated in both urban (2) and rural (3) areas).

3. Prevention of Parent to Child Transmission (PPTCT) Center: All the PPTCT Centers in the entire district of Mangalore. Totally there were 13 (this included 7 in Government hospitals, 6 in Private hospitals including medical collages. 4 of the 13 in urban and 9 in rural areas)

4. Blood Banks (BB): All the blood banks in the entire district. Totally there were 9 (which included 1 from government located in district hospital and 8 private ones situated in both rural (3) and urban (6) areas).

Method of data collection: Consent for data collection was obtained from Medical Superintendent of District Government Hospital, District Health Officer and Family Welfare Officer of Department of Health and Family Welfare,

Mangalore, and also from Nodal officer for HIV / AIDS Mangalore. Data starting from 2001 up to the year 2007 was collected. Data prior to 2001 was not available.

Data was collected for once a year. All the data of a center was aggregated for the entire year for all the centers in the district. For instance all the data of Blood Banks (BBs) was totaled for the entire year from all the BBs in entire district to yield a single integrated data of BBs for that year. Similar procedure was followed for the data from all the centers. Data was collected for the new cases detected in each of the centers. Cross checking was done to avoid double counting of cases ie, one case getting counted more than once.

As the program was getting streamlined in the year 2001 – 2003, some of the records were not maintained. Efforts were made to get all the available data.

Operational definitions: The operational definitions were as per NACOs guidelines [6].

High risk population—Those who have sexual intercourse with multiple partners, those share inadequately sterilized needles, syringes or any other skin piercing instruments [6]. For the purpose of analyses the attendees from STD Clinics and VCTCs who had history of high risk behaviour were considered as high risk population.

Low risk population – Pregnant women, attendees of Blood banks, and those among VCTCs and STD Clinics (Excluding those mentioned under high risk) [6]. For the purpose of analyses attendees to PPTCTs and BBs, and those among

VCTCs and STD Clinics (Excluding those mentioned under high risk) were considered as Low risk group.

HIV Suspect: Who is positive for the single ELISA / Rapid / Simple tests (ERS tests) [6].

Confirmed case: who has tested positive for 3 ERS tests (Since 2003 till date. Changes in policy prompted changes in testing strategies). who has tested positive for any two of 3 ERS tests (Before 2003) [6].

Testing Strategy: Used in these centers is as follows

1. Unlinked anonymous testing of samples in STD Clinics and Blood Banks [7].

2. In VCTCs and PPTCTs it was Pretest counseling – Testing – Post test counseling format [7].

Data analyses: Data was entered in SPSS Version 12and analyzed. The results were analyzed according to centers (PPTCT, VCTC, STD Clinics, BB), risk groups (High Risk, Low Risk), location (Urban and Rural) and gender (males and females) for each of the years to get an idea of transmission of HIV and to understand the change in patterns of transmission if any. Estimate of Total prevalence for each of the years was calculated along with its 95% confidence intervals. To examine the significance of change in prevalence over a period of time Chi-Square for Linear trend was computed using EPI INFO version 1. Significance of change in the number of HIV cases with time was tested with a correlation coefficient using SPSS Version 12. P value of less than 0.05 was considered as significant. The results have been expressed in appropriate tables and diagram.

Results

(Table 1) Total Prevalence of HIV infection in this district seems to be decreasing over a period of time (except for the year 2006 when it has shown a upward trend) with increasing prevalence in high risk group and decreasing prevalence in low risk group. This change in prevalence is statistically significant.

Data (form Table 2) indicate that the proportion of HIV +ves among the Antenatal mothers attending the PPTCT has decreased, and among the blood donors in the blood banks has decreased over a period of time. But the proportion among attendees of VCTCs and the STD clinics indicates that the prevalence has increased among these groups. So the net effect is an increase in the prevalence in the high risk group and a decrease in the low prevalence group. Increase in the proportion of HIV +ve among the high risk groups has negated the encouraging trends observed among the low risk groups.

(Table 3) Prevalence among the males is higher as compared to females. But there is increasing trend among the females and decreasing among the males. Prevalence in the urban areas has decreased and among the rural areas has increased over a period of time even though prevalence in urban areas is higher than rural areas.

Discussion

It is known that the prevalence among the ANCs indicates the prevalence among the general population [1,2]. It has been shown that the HIV seroreactivity among the blood donors can be used as marker of HIV prevalence among the general population [8]. The data from blood banks and the PPTCT centers indicate that the prevalence among the general population has decreased (Table 1). This pattern is different from the pattern observed for the state of Karnataka where the proportion of HIV +ves among ANCs has remained constant with a slight increase among the STD cases over a period of time [1,2]. National trends reflect fluctuating proportions among STD Cases (with the most recent data showing an increase) and an overall increasing trend among the ANCs [1,2]. So, Targeted Interventions for control of HIV infection among the high risk group requires greater emphasis in Mangalore District as compared to the Karnataka State as whole. Increase in proportion of HIV +ve individuals among the STD cases has been noted in the states of Orissa and Delhi as well. But the proportion among ANC s has remained constant in Delhi and increased in Orissa [9]. These trends are again different from the national trends [1,2]. In Andhra Pradesh the proportion among ANCs and STD cases has increased (with higher proportions among STD cases). Tamil Nadu shows a steady increase in both these groups [1,2]. So these patterns indicate that the HIV epidemic in our country is heterogonous necessitating different priorities for different regions. Efforts to implement blood safety seem to have yielded good results here as compared to Karnataka state or national trends[1,2].

Prevalence among the males is higher as compared to females, indicating that the spread of HIV infection is occurring from males to females (Table 3). But there is increasing trend among the females and decreasing among the males. This indicates that gradually the trend of transmission is changing to "females to males pattern". This is in contrast to the national trends where the proportion of females has remained roughly same and the predominant mode of transmission is from male to female. It is generally felt that rapid urbanization with boom in the IT sector in this part has resulted in more single unmarried youngsters. This is again reflected in the increasing prevalence in the high risk group.

Changes in prevalence in urban and rural areas indicate that the transmission of HIV which was mainly from urban to rural areas will gradually change to "rural to urban pattern". This is trend is similar to the national trend[1,2].

There are two important limitations with this data.

1. When the program began there were few testing centers in the urban areas only and all the people were directed to these centers. As the program expanded with more testing facilities in the years 2002 to 2003 more people were tested than previous years. Because of increase in the number of people tested (2001 to 2003), the prevalence tends to have decreased drastically form 2001 to 2003. Because of this bias the results for this period are difficult to interpret. But the figures from 2003 till 2006 reflect more stable trend. Increasing number of HIV cases even from the year 2003 indicates that we

may not in the right track to contain the spread in this region. Similarly studies should be undertaken to find out the pattern in the respective Sentinel sites / Districts / Regions to enable better planning and implementation of strategies to suit the local circumstances, so that we may contain the spread in the long run and achieve the Millennium Development Goal.

2. As HIV infection is associated with stigma, not all the people may come forward for testing, there may be an underestimation of the problem biasing the results. But this bias is common to the entire country and not limited to one region only.

Certain strategies like Targeted interventions (towards high risk group, focused on rural areas and on women) would be more useful to control the spread of infection in this area. Because of the differences in the epidemiological trends between the local, state and national trends, it is necessary to adopt area specific differential approaches so that we can ultimately control the HIV epidemics in our country. It also necessary to undertake studies to know the trends at each sentinel site to arrive at area specific strategies. Differential area specific strategies would help the country in the long run to achieve the Millennium Development Goal.

Acknowledgements

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Table 1

Estimates of Prevalence from year 2001 – 2006[*]

Category	Years						Chi-square for linear trend (p) [**]
	2001	2002	2003	2004	2005	2006	
Total prevalence % (95%CI)	26.12 (19.83-- 32.41)	13.02 (12.27 – 13.79)	3.48 (3.45 – 3.51)	1.91 (1.9 – 1.92)	1.89 (1.889 – 1.891)	2.63 (2.617 – 2.643)	42.219 (<0.0000)
Prevalence among High risk group %	---	---	9.8	11.12	13.64	19.8	4.374 (0.036)
Prevalence among Low risk group %	---	---	0.63	0.57	0.49	0.35	16.892 (<0.0000)

[*]As the estimates were for completed years data for the year 2007 was not included

[**] P < 0.05 was considered to be significant.

Table 2

Distribution of cases from year 2001 – April 2007 from centers in the entire district of Mangalore.

Sites	2001 (%)	2002 (%)	2003 (%)	2004 (%)	2005 (%)	2006 (%)	2007$^{\psi}$ (%)
PPTCT							
1.Total referred	--- *	2112¶	5986	5872	6820	8769	2465
2.Total tested	--- *	1028 (48.67)	4106 (68.59)	4295 (73.14)	5549 (81.36)	7111 (81.09)	1559 (63.25)
3. Total seropositive	--- *	24 (2.33)	49 (1.19)	59 (1.37)	54 (0.97)	64 (0.90)	14 (0.90)
VCTC							
1.Total reported- Male	412	1086	1052	1367	1611	1312	1100
2.Total reported Female	189	827	704	942	786	998	723
3.Total Seropositive	157 (26.12)	359 (18.8)	495 (43.79)	476 (20.6)	547 (22.8)	834 (36.10)	397 (21.78)
STD Clinics							
1.Total tested	--- *	--- *	1870	2251	1927	2231	252
2.Total HIV positive	--- *	--- *	80 (4.28)	31 (1.38)	43 (2.23)	65 (2.91)	Nil
Blood Banks							
1. Total tested	--- *	--- *	14345	27116	30823	26996	11199
2. .HIV Suspicious	--- *	--- *	145 (1.01)	121 (0.45)	125 (0.41)	54 (0.20)	19 (0.17)

* As the program was still getting expanded, records were not properly maintained and hence data for this period is not available.

¶ Data for PPTCT is available only from the month of October of 2002 as the center was opened at that time.

$^{\psi}$ Data for the months of January 2007 through April.

Table 3

Estimates of Prevalence -- comparison by Location and Gender form year 2001 – 2006[*]

Category	Years						Chi-square for linear trend (p) [**]
	2001	2002	2003	2004	2005	2006	
Prevalence in Rural area %	---	---	17.3	20.4	38.7	46.8	27.827 (<0.0000)
Prevalence in Urban area %	---	---	82.7	79.6	61.3	53.2	
Prevalence among Males %	---	---	72.5	60.9	56.8	52.3	8.549 (0.0035)
Prevalence among Females %	---	---	27.5	39.1	43.2	47.7	

[*]As the estimates were for completed years data for the year 2007 was not included

[**] P < 0.05 was considered to be significant.