

# SAARC

(South Asian Association for Regional Cooperation)

## Journal of Tuberculosis, Lung Diseases and HIV/AIDS



Vol – II, No.- 1, Year-2005

The Official Journal of the SAARC Tuberculosis Centre

**Editorial** ..... iii

### **Original Articles:**

1. Is awareness of HIV enough to alter high-risk behaviour?  
What do HIV positive individuals have to say? A study from South India----- 1  
*-Beena E Thomas, Suryanarayanan D, Muniyandi M, Meenalochani  
Dilip, Rajasekaran S, Soumya Swaminathan*
2. Detection of Intracellular TNF- $\alpha$  and IL-10 in CD4 And CD8 T Cells of  
Patients with Pulmonary Tuberculosis using a Flow Cytometer ----- 10  
*- N. Thapa, G. A. W. Rook, H. Donoghue , J. L. Stanford*
3. Gender differences in perceived health related quality of life among  
persons living with HIV – A study from Chennai, South India ----- 15  
*- Beena Elizabeth Thomas, Josephine Arockiaselvi, Suryanarayanan D,  
Fathima Rehman, Padmapriyadarsini, Soumya Swaminathan*
4. The Proportions of CD4, CD8, CD3 T Cells in Peripheral Circulation of  
Patients with Pulmonary Tuberculosis----- 23  
*- N. Thapa , P. Lydyard , G. A. W. Rook, J. L. Stanford*
5. Socio-demographic characteristics of families with and without TB suspects: findings  
from a community based survey in Kathmandu valley ----- 28  
*- M M Rahman, K K Jha, R M Piryani, B P Rijal*
6. Smoking Habits among School Teachers of Taluka Nagarparkar, Sindh, Pakistan----- 35  
*- Rano Mal Piryani, Meva Ram, Setal Das, Guatam*
7. Perceptions on tuberculosis and its cure among the government welfare sector  
providers in Chennai city, South India----- 37  
*- Geetharamani Shanmugam, M Muniyandi, Kalaiselvi Mani*
8. Understanding the Hidden Burden of Tuberculosis in a District of Eastern Nepal ----- 46  
*- N. Jha, P. K. Pokharel, S Koirala, S. K. Bhattacharya, B. M. S. Karki,  
R. K. Rauniyar, D. D. Baral*

### **Book Review:**

9. Prevention of Transmission of Blood-borne Infections HIV, Hepatitis B and  
Hepatitis C in the Health Care Setting Manual by Madhur Dev Bhattarai ----- 52  
*- D. L. Singh*

### **Address:**

SAARC Tuberculosis Centre,  
Thimi, Bhaktapur,  
G.P.O. Box 9517  
Tel: 00977-1-6631048, 6632601, 6632477  
Fax: 00977-1-6634379  
E-mail: saarctb@mos.com.np  
Website: www.saarctb.com.np

# SAARC Journal of Tuberculosis, Lung Diseases and HIV/AIDS

Vol. II

No. 1

Year 2005

## Editorial Board

**Chief Editor:**

K. K. Jha

**Editor:**

R. M. Piryani

**Co-editor:**

Md. M. Rahman

**Editorial Board from Member Countries:**

Vikarunnessa Begum, Bangladesh

Gado Tshering, Bhutan

L. S. Chauhan, India

Ibrahim Shaheem, Maldives

Keshab Bhakta Shrestha, Nepal

Sayed Kram Shah, Pakistan

Chandrika Sarukkali, Sri Lanka

SAARC Journal of Tuberculosis, Lung Diseases and HIV/AIDS is published and distributed by :

SAARC Tuberculosis Centre

Thimi, Bhaktapur

G.P.O. Box 9517, Kathmandu, Nepal

Tel.: 00977-01-6632601, 6632477

Fax: 00977-1-6634379

E-mail : saarctb@mos.com.np

Website: www.saarctb.com.np

The views/statements/opinions etc. expressed in the various articles are those of authors and do not represent the official views of SAARC Tuberculosis Centre or Editors.  
All the scientific materials included in the journal are the copyright of SAARC Tuberculosis Centre and it is essential to get the written permission prior to reproduction.

# Editorial

Tuberculosis is a major public health problem in the SAARC Region. Almost 50% of the adult population of this Region has already been infected with Mycobacterium tuberculosis. WHO declared TB as a Global emergency in 1993. World Health Assembly fixed the global targets for TB control – detection of 70% infectious TB cases and 85% treatment success rate of detected cases. The targets need to be achieved by the year 2005.

All the SAARC Member States adopted DOTS by 1996. Currently TB control situation is far better in terms of DOTS population coverage, case detection rate and treatment success rate in the SAARC Region. It is hoped that Region will achieve the designated target by 2005.

The Member States of the Region are planning to achieve the Millennium Development Goals & Targets, which has been set for the year 2015.

The main obstacle in sustaining TB control achievements is HIV/AIDS. The emergence of HIV has made the TB control programme complex. The overall HIV prevalence in the SAARC Region is low, but there are major public health concerns regarding the future growth potential of HIV/AIDS within the Region. All the Member States have been pursuing efforts at the National level to manage the growing menace triggered by the spread of HIV/AIDS. HIV and TB both fuel each other. So, the dual epidemic of TB and HIV must be addressed together with strengthened health system. A joint response is there but it has to be geared up.

To tackle TB/HIV co-infection in the Region, a Regional Strategy for TB/HIV co-infection has been developed by SAARC TB Centre under SAARC-Canada Regional TB and HIV/AIDS Project in the year 2003, which is endorsed by the SAARC Member States. Action plan for implementation has been framed in 2004.

Member States are also signatories to UNGASS declaration. To fulfill the commitment to deal HIV/AIDS epidemic, Regional Strategy for HIV/AIDS is in the process of development under the technical support of UNAIDS.

Still there is a long way to travel.....

## Instructions to Authors

*SAARC Journal of Tuberculosis, Lung Diseases and HIV/AIDS* is a SAARC journal published every six-month. Original articles, review articles, short reports and other communications related to TB, Lung diseases and HIV/AIDS are welcome for publication.

Papers submitted for publication to SAARC Journal should not have been submitted simultaneously to other Journal or already accepted articles for publication by any other journal should not be submitted to SAARC Journal. Two copies of each manuscript should be submitted.

Use double spacing throughout, including title, abstract, text, acknowledge, reference, table and legends for illustrations. Begin each of the following sections on a separate paper. Number pages consecutively.

Title page should contain (a) concise title, (b) a short summary, (c) first name middle initial and last name of each author, (d) name of department(s) and institution(s) to which the work should be attributed, (e) name, e-mail and postal address of author responsible for correspondence about the article.

### **Abstract:**

Should not be of more than 200 words and should state the purpose of the study or investigations, basic procedure, main findings (give specific data and statistical significance if possible) and the conclusion, (emphasize new or important aspects of the study).

### **Key words:**

Below the abstract- identify 3-10 key words to assist indexers in cross-indexing the article. Non-standard abbreviations should be avoided. Generic name of the drugs should preferably be used; proprietary name may be used along with the generic name.

### **Text:**

It should be divided into sections with headings as Introduction, Methods, Results Discussion, Conclusion and References.

### **Introduction:**

It should state the purpose of the study and summarize the rationale for the study. It should have pertinent references but not extensive review of the subject.

### **Methods:**

Describe the criteria for selection of cases; identify the methods, apparatus (manufacturers name) and procedures in detail.

## Is awareness of HIV enough to alter high-risk behaviour? What do HIV positive individuals have to say?

Beena E Thomas<sup>1</sup>, Suryanarayanan D<sup>2</sup>, Muniyandi M<sup>1</sup>, Meenalochani Dilip<sup>1</sup>,  
Rajasekaran S<sup>3</sup>, Soumya Swaminathan<sup>1</sup>

<sup>1</sup>Division of HIV/AIDS, Tuberculosis Research Centre (ICMR), Chennai, India.

<sup>2</sup>Department of Statistics, Tuberculosis Research Centre (ICMR), Chennai, India.

<sup>3</sup>Government Hospital of Thoracic Medicine, Tambaram Sanatorium, Chennai, India.

### Abstract

This study was done to find out the awareness of HIV among HIV positive individuals before being diagnosed HIV positive. The study also provides information on whether their knowledge influenced their risk behavior if any. This is a descriptive study and data has been collected from 108 HIV positive individuals from Chennai, South India. Awareness of HIV and its mode of transmission were as high as 85%. Gender and literacy has not been a barrier to awareness. In spite of awareness of HIV/AIDS and its spread, 73% of the respondents continued risk behaviour. The respondents included men and women and their reasons for risk behavior and their manifold misconceptions have been reported. The findings call for the need to address these issues in preventive programmes aimed at HIV control.

*Key words:* HIV, awareness, misconceptions, high-risk behaviour.

### Introduction

India's socio-economic status, traditional social ills, cultural myths on sex and sexuality and a huge population of marginalized people make it extremely vulnerable to the HIV/AIDS epidemic. In fact the epidemic has become the most serious public problem since independence. South and South East Asia are now the epicenters of the HIV epidemic with the majority of future infections expected to occur in these regions. Within South Asia India is

expected to have the largest burden of the epidemic in terms of numbers. With a population of 1,027 billion people, the HIV/AIDS infection rate is estimated at 0.7% of the adult population<sup>1</sup>. Many predict that this nation of one billion people will soon see infection rates soar if current prevention programmes are not scaled up<sup>2</sup>.

The government has taken up health education programmes and the awareness of HIV/AIDS has increased considerably<sup>3,4</sup>. In the absence of a cure or vaccine for HIV infection, prevention and education remain the primary strategy against HIV transmission<sup>5</sup> and early HIV detection<sup>6,7</sup>. Previous studies have also shown that knowledge leads to changes in perception of personal vulnerability to HIV and to subsequent action to reduce

### Correspondence to:

Dr Soumya Swaminathan  
Deputy Director, Division of HIV / AIDS  
Tuberculosis Research Centre,  
Mayor V. R. Ramanathan Road, Chetpet,  
Chennai - 600031, India.  
Ph: +91 44 2836 2442, 2836 2432-35  
Fax: +91 44 2836 2528 / 29  
Email: [doctorsoumya@yahoo.com](mailto:doctorsoumya@yahoo.com)  
[beenaelli@hotmail.com](mailto:beenaelli@hotmail.com)

**Results:**

Present the results in sequence in the text, tables and figures. Do not repeat all the data in the tables and/or figures in the text. Summarize the important points only. Mention the methods used for statistical analysis.

**Discussion:**

Comment on the observations of the study and the conclusions derived from it. Do not repeat the data in detail already given in the results. Give implications of the findings, their limitations and observations to other relevant studies. Avoid unqualified statements and conclusions, which are not completely supported by the data. Avoid claiming priority. New hypothesis may be labeled as recommendations.

**Reference:**

Number references consecutively, as they appear in the text; identify reference in text, tables and figures. List all authors. Avoid using abstracts, unpublished data, and personal communications as references. Include references, which have been accepted for publication but not published by denoting "in press".

**Tables:**

Type, each table on a separate sheet, use double space. Give a brief title for each table. Cite each table in the text in consecutive order.

**Figures:**

Should be professionally drawn. Free hand lettering is unacceptable. Illustrations can be photographed (Black and White glossy prints) and numbered. If photographs of persons are to be used, either take permission from the person or make the picture unidentifiable. Each figure should have a label pasted on its back indicating name of the author at the top of the figure.

Send all manuscripts to the Chief Editor, ***SAARC Journal of Tuberculosis, Lung Diseases and HIV/AIDS.***

SAARC Tuberculosis Centre, Thimi, Bhaktapur

G. P. O. Box 9517, Kathmandu, Nepal.

Tel: 00977-1-6632601, 6632477

Fax: 00977-1-6634379

E-mail: saarctb@mos.com.np

---

All rights reserved, any part of this publication may be reproduced, stored in a retrieval system or transmitted in any form. However, it should be acknowledged.

*The publisher and the members of editorial board cannot be held responsible for errors or for any consequences arising from the use of the information contained in this journal.*

---

HIV risk behaviors<sup>8,9</sup>. Education in health promotion/risk avoidance is therefore often considered the first line of defense against public health threats<sup>10</sup>.

However even where knowledge has been substantially increased, 'knowing' is not necessarily 'doing'. In the individual-level literature on adults, HIV knowledge was found to be necessary but not sufficient condition to effect change in HIV risk behaviors<sup>11</sup>. Increases in rates of syphilis in the US in the minority communities reflect the failure of educational efforts to reach them<sup>12</sup>. Change is therefore the desideratum of health education. There are on the one hand positive effects of health education and on the other hand education does not seem to influence behavior change. There is dearth of information in this context from India except for the impact of health education with the increase use of condoms among truck drivers and commercial sex workers<sup>13,14</sup>.

It was therefore felt that with all these prevention efforts made towards HIV control, it is important to find out the impact of awareness of HIV /AIDS on risk behavior from HIV positive individuals themselves. These individuals had obviously exposed themselves to risk before a diagnosis of HIV was made. It was also important to find out from them what led them to risk behavior. It is against this background that this study was planned. The findings of this study could help to bring out important issues, which need to be addressed in health education programmes aimed at prevention of HIV /AIDS.

## Methods

The respondents were HIV positive individuals attending the clinics in

Tambaram Sanatorium, STD clinic of the General Hospital and the Tuberculosis Research Centre, Chennai as out patients from October 2000 to March 2002. Respondents, who were willing to participate, spare their time and not too ill to respond were considered for the study after their informed consent was obtained. They were assured strict confidentiality that their names would not be used for the purpose of the study. One hundred and eight HIV positive individuals were interviewed using a semi structured interview schedule. Qualitative data was collected with the help of vignettes, which were noted down as expressed by the respondent. The respondents were divided into two groups depending on their awareness of HIV/AIDS risk behaviour. The researcher has used the terms '*Before*' and '*After*'. '*Before*' refers to the group who had risk behaviour before being aware of HIV as a disease, before their diagnosis of HIV. The '*After*' group are those who had risk behaviour in spite of being aware of HIV, before their diagnosis was made. "Risk" refers to premarital and extra marital intercourse and IV drug abuse and for those married refers to unprotected sexual intercourse in spite of being aware of their spouse's promiscuous behaviour. "Awareness" refers to their awareness of HIV/AIDS as a disease and its mode of spread and not their HIV status. Data were checked for errors, entered and analyzed using the SPSS (10.5 version) package.

## Results

### Profile of patients

The demographic details are presented in Table I. Among the 108 respondents 65% were males, 80% were between 25-44 years. One third of the male respondents were drivers and half of the female respondents were housewives. Fifty

---

percent of the respondents were illiterate. Six of the respondents were commercial sex workers.

### Awareness of HIV/AIDS

Of the 108 respondents 92 (85%) said they were aware of HIV/AIDS before their diagnosis of HIV. Most the responses were that HIV was caused by having sex with multiple sex partners, IV drug use and blood transfusion. The main source of information among them was the mass media especially the television programmes and the other source was through word of mouth. Forty-two (78%) of illiterates were aware of HIV/AIDS (Fig 1).

### Risk behavior 'before' and 'after' being aware of HIV/AIDS

Among the 92 (85%) who were aware of HIV/AIDS, 26(28%) indulged in risk behaviour (sexual / drug abuse) before being aware of HIV/AIDS. They comprised of 13 women and 13 men. The other group, 66 (72%) indulged in risk behaviour in spite of being aware of HIV/AIDS. They comprised of 15 women and 51 men.

### Reasons for risk behavior 'before' being aware of HIV among women (n = 13) and men (n = 13)

Among the women respondents, there were multiple reasons given for indulging in risk behaviour before being aware of HIV/AIDS. The main reason given was that they trusted their husbands 8 (62%). The other reasons expressed were no choice in the matter, sexual desire or used condoms. Four of the six commercial sex workers said that it was

part of their job. To elaborate on these reasons narrative summaries from the women respondents have been quoted. (Box 1)

Some of the reasons given by the male respondents to having risk behaviour before being aware of HIV/AIDS were, 'did not think I will be infected' (31%) sexual desire (23%), peer pressure (23%), sign of manhood (15%), alcohol (15%) or part of the job (15%). Some of these reasons are expressed in narrative summaries. (Box 2)

### Reasons for risk behavior 'after' being aware of HIV among women (n = 15) and men (n = 51)

The reasons for continuing risk behaviour 'after' knowing about HIV are reported in (Fig 2 & Box 3a, Box 3b). Among the women respondents the reasons given were, No choice/Sexual harassment (33%) and acceptance of spouse's HIV status (33%). The reasons given by the men were peer pressure (41%) followed by sexual desire (25%) influence of alcohol (29%), part of the job culture (18%) did not think I would be infected (18%), sex with known persons (14%), and that they used precautions (11%) cheated/seduced. Some of the misconceptions for their risk behavior were that they thought HIV/AIDS is a disease of the west, only city girls have AIDS, heat of the engine would kill HIV germs, sex was a sign of manhood and that messages on HIV/AIDS were only to scare people and that they believed HIV is curable. Some respondents said their marital problems led them to risk behavior.



**Table 1** Profile of interviewed patients (n =108)

	Male (n = 70)		Female (n = 38)	
	No.	%	No.	%
<b>Age in years</b>				
15-24	4	6	8	21
25-34	37	53	19	50
35-44	21	30	9	24
45+	8	11	2	5
<b>Occupation</b>				
Unskilled	12	17	-	-
Skilled	11	16	-	-
Driver	25	35	-	-
Business	11	16	3	8
Agriculture	8	11	4	10
Salaried	3	4	3	8
Housewife	-	-	22	58
Commercial Sex Worker	-	-	6	16

**Box 1. Women believed their husbands**

- “My husband said he had not had sex before marriage and I believed him”
- “I have never had sex outside marriage nor have I ever suspected my husband’s fidelity”
- “My husband died of HIV. I knew about his HIV status only when he was ill. I took him to different places and he was treated for various illnesses. I did not know my husband had sex outside marriage. In any case even if I knew it would not have made a difference. I have never refused him sex when he wanted it. I had to agree. He would hit me if I refused him”
- “My mother struggled to get me married. She was a widow. She chose my husband from a good family. I never thought he would have HIV. Now that I have already tested positive there is nothing I can do. I cannot go back home, my sister’s marriage will be affected. I had vowed that I will be with my husband at our wedding whether in sickness or in good times. I need to accept my fate and move on”
- “I have no idea how I could have got this infection. Ours was a love marriage. I left my family to marry this man. I have only him”

**Box 2. Reasons for risk behavior before awareness – Men**

- “I am a drug user. I did not know that this caused HIV/AIDS. I thought HIV was only through women and I never went to women. This was my only vice”
- “I knew about STD and so I used to go only to women I knew and not to commercial sex workers”
- “I was too young and not aware of HIV. Most young men go to Commercial sex workers, as we cannot control our sexual desires. I do not feel guilty”
- “Me and my friends would have a few drinks and then go to sex workers. If I did not comply they would “make fun of me. I never knew about HIV/AIDS. I would not have gone, if I knew”

**Box 3a. Reasons for risk behavior "after" awareness**

**Women**

- "I was aware my husband was promiscuous. I thought he would get infected. I never thought I could get infected by him!"
- "I knew my husband was having sexual relationships outside our marriage. In I refused him sex he would bring other women"
- "I knew my husband was infected with HIV. I still continued my relationship with him as I love him very much and I consider this my fate"

**Box 3b. Reasons for risk behavior "after" awareness**

**Men**

- "Once I heard about HIV/AIDS I stopped going to sex workers. I only go to known persons"
- "I used precautions 90% of the time ever since I heard about HIV"
- "I thought this was a disease of the west. Every time I went to a sex worker I washed my genitals with soda and I thought I was safe"
- "I am influenced by my friends under the influence of alcohol. For us truck drivers this is part of our job"
- "Among the truck drivers we believe that the heat from the engine kills germs and we are exposed to a lot of heat. I therefore indulged in sex with a number of sex workers and never thought I would get infected"
- "My friends told me that every time I went to a prostitute I should have penicillin shots and that would protect me. I did just that and thought I was protected"
- "My friends told me that village girls do not get AIDS. Only city girls get AIDS"
- "My wife does not enjoy sex so I went to other women in spite of knowing about HIV. How else could I satisfy my sexual desire?"
- "My desires got the better of me. I thought HIV was treatable"
- "I used to get drunk and then go to women. I had no idea what I was doing then. I did know about the risk of HIV but who thinks of all that then?"

**Fig 1. Education vs. awareness among HIV /AIDS patients**

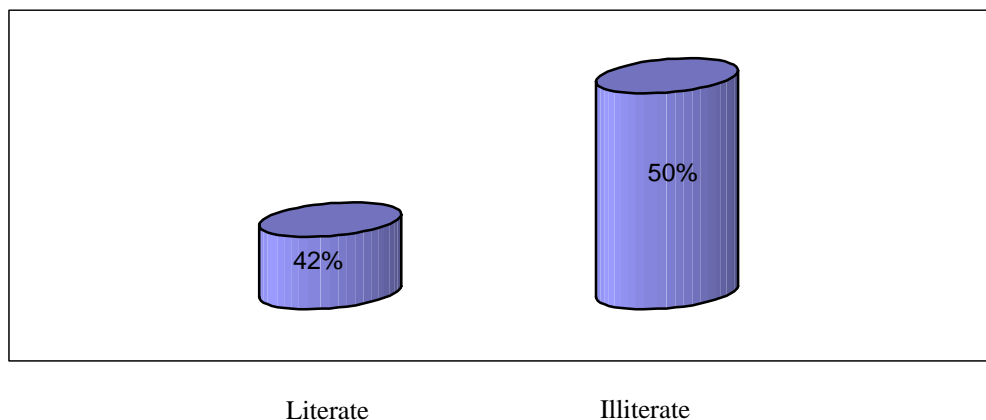
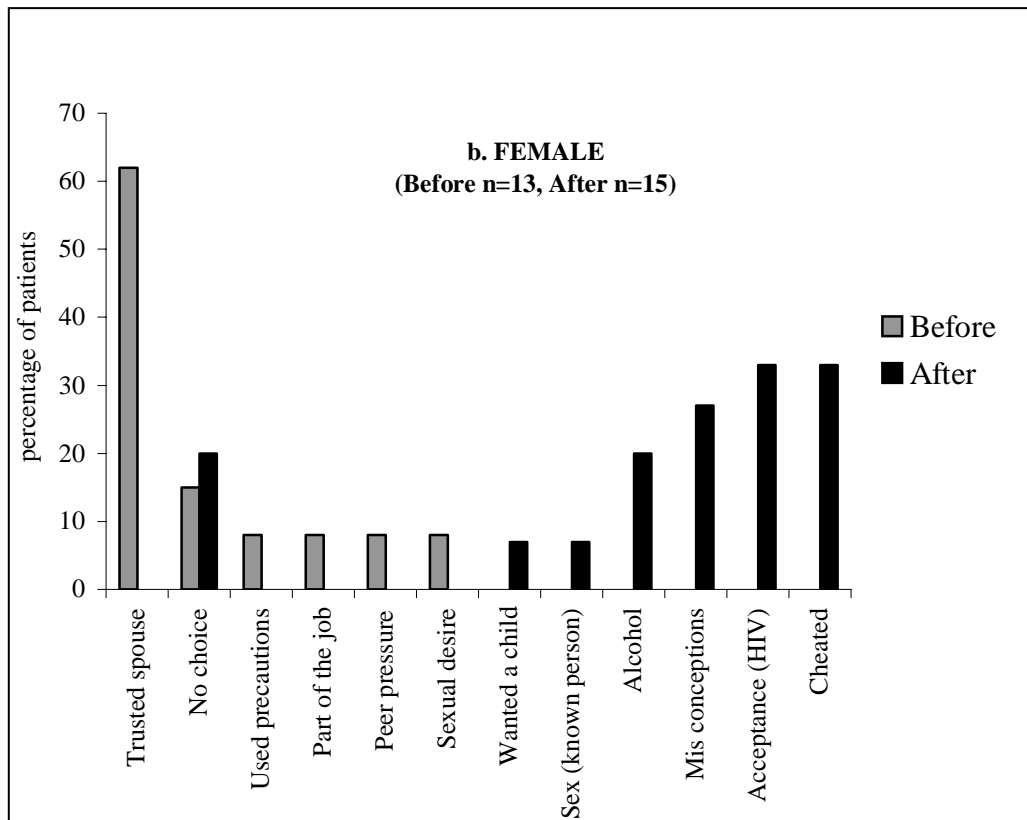
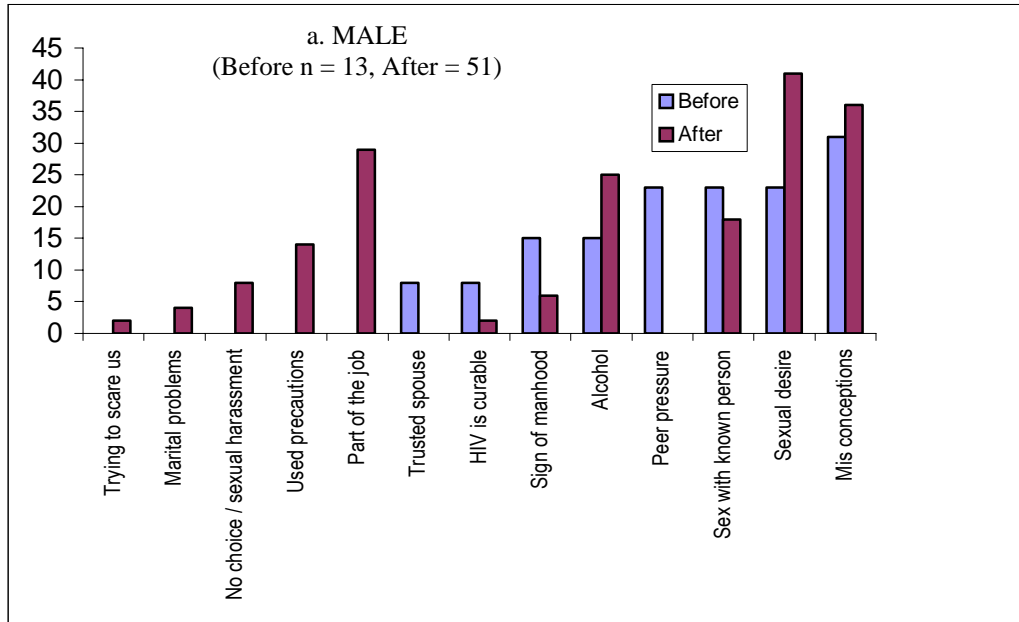


Fig 2. Reasons for high-risk behaviour reported by male and female HIV/AIDS patients before and after being aware of HIV (Multiple answers)



---

## Discussion

This study is unique in that it brings out perceptions among HIV positive individuals on their awareness of HIV as a disease even before their diagnosis was made and the reasons for their risk behavior if any. It endorses the fact that awareness alone does not and will not result in behavioral change. Awareness is high among the respondents in keeping with the data that has been reported from India<sup>3</sup>. However nearly three fourths of the respondents continued to have risk behavior in spite of being aware of HIV/AIDS. The manifold misconceptions such as heat kills germs, only city girls have AIDS, washing genitals with soda bicarbonate or a shot of penicillin after a sexual act, throw a lot of light on the reasons for risk behavior in spite of awareness of HIV/AIDS. Among the very few who were drug users, one respondent said that he had heard of HIV but was under the impression that it was only through sex and not IV drug abuse. It has been reported that publishing 'scientific facts' of the disease to the general public results in little change in health related behavior<sup>15</sup>. In a study on behavior change in HIV infected subjects following health education it was reported that the knowledge of AIDS though adequate did not seem to influence significantly the 'change' or 'no change' in promiscuity<sup>16</sup>. This study has also brought out the largely influencing factors such as peer pressure, sexual desire, and alcohol for risk behavior. Among the women in this study irrespective of the group, whether before awareness or after awareness there is a sense of helplessness, exploitation and harassment. In India simply being married is a risk factor to HIV as the transmission from husbands to wives is frequently observed<sup>17-19</sup>. There is the issue of Indian

culture where a woman is expected to serve her husband whatever the case maybe. A woman who defies her husband should be willing to risk being thrown out of the house and rejected by society. There is therefore a sense of acceptance even if her husband is promiscuous or HIV positive. In general researchers have preferred many explanations for the HIV risk of minority women: feeling of powerlessness that lead to experience of helplessness, a short-term view of the world and of the consequences of behaviour due to a mere violent and chaotic environment, higher rates of prostitution due to economic strain, and denial of vulnerability to AIDS risk<sup>20-24</sup>. Ethnically determined values can influence perceptions of HIV, attitudes toward high-risk behaviour, norms of behaviour, and the potential for behavioral change<sup>25-29</sup>. Many forces that subject them to HIV risk therefore control women and the need of the hour is to address these issues so that their potential for behaviour change can be successfully utilized in HIV prevention programs.

Different population segments have different educational needs, requiring input from members of targeted population to develop gender sensitive, relevant, language appropriate and effective programs and materials. The influence of peer pressure and therefore the need for peer educators, which have already been introduced, needs to be exploited in all prevention programs'. However one has to keep in mind the influencing factors and misconceptions which could dilute the program if not addressed and render them inefficient to change behavior.

Parents need to be involved in imparting sex education at a very early age before their children give in to peer pressure. Therefore health education programmes

---

targeting parents on how to impart this education and the message about potential dangers of HIV/AIDS that are 'adolescent friendly' need to be developed.

### Limitations

This study has been done in a hospital based setting among HIV positive individuals and therefore not representative of the general population. The sample is too small and insufficient to come to broad based conclusions. There is an urgent need to understand the awareness patterns and misconceptions on HIV among different sections of the community both in urban and rural areas in order to have a better perspective.

### Acknowledgements

Authors would like to acknowledge the staff of the Tambaram Hospital and STD department of General Hospital, Chennai for their support in carrying out the study. We would also like to thank the respondents being forthcoming in their responses reflecting their trust in us. The authors would like to acknowledge Dr. P. Venkatesan and Dr. K.P Narendar for their support in carrying out the study. The authors thank Dr. P.R. Narayanan, Director, Tuberculosis Research Centre for his constant encouragement and guidance.

### REFERENCES

1. UNAIDS. World Health Organization. AIDS Epidemic Update.  
<http://www.unaids.org/worldaidsday/2002/presentation/update/epiupdateen.pdf>. December (2002).
2. Ratnathicam, A. (2001). Aids in India: incidence, prevalence and prevention, *AIDS-Patient-Care-STDs*, 15(5), 255-261.
3. NACO. (2001). *National Baseline general Population Behavioral Surveillance*.
4. TNSACS. (2002). *Behavioral Surveillance Survey-Rural Round 11*.
5. Kirby, D., and Di Clemente. (1994). School-based interventions to prevent unprotected sex and HIV among adolescents. In R. J. DiClemente and J.L. Peterson (Eds.), *Preventing AIDS: Theories and methods of behavioral interventions* (pp. 117-139). New York: Plenum
6. Flaskerud, J.H., & Nyamathi, A.M. (1989). Black and Latina women's AIDS related knowledge, attitudes and practices. *Research in Nursing and Health*, 12(6), 339-346.
7. Linville, P. W., Fischer, G. W., and Fiscoff, B. (1993). *AIDS risk perceptions and decision biases*. In J.B.Pyror and G.D. Reeder (Eds.), *The social psychology of HIV infection* (pp. 5-38). Hillsdale, NJ: Lawrence Erlbaum Associates.
8. Prochaska, J.O., Di Clemente, C.C., & Norcross, J.C. (1992). In search of how people change: Applications to addictive behaviors. *American Psychologist*, 47, 1102-1114.
9. Rosenstock, I.M., Strecher, V.J., & Becker, M.H. (1994). The health belief model and HIV risk behaviour change. In R.J, DiClemente & J.L Peterson (Eds). *Preventing AIDS: Theories and methods of behavioral interventions* (pp5-24) New York: Plenum.
10. Williams, G. (1969). *The plague killers*. New York: Charles Scribner's
11. Padian, N.S., Wiggert, J. H., and O'Brien, T.R. (1994). Interventions for sexual partners of HIV-infected or high-risk individuals. In R. J. DiClemente and J. L. Peterson (Eds.), *Preventing AIDS: Theories and methods of behavioral interventions* (pp. 117-1390. New York: Plenum.
12. Centre for Disease Control. (1988). Syphilis and congenital syphilis—United States 1985-1988. *Morbidity Mortality Weekly Report*, 37, 486

- 
13. APAC-BSS Wave (2001). *HIV risk behaviour surveillance survey in Tamil Nadu and Pondicherry*
  14. Chakroborty, A.K., Jana, S., Das, A., Khodakevich, L., Chakroborty, M.S., & Pal, N.K. (1994). Community based survey of STD/HIV infection among commercial sex workers in Calcutta (India). Part 1. Some social features of commercial sex workers. *Journal of communicable diseases*, 26(3), 161-167.
  15. Warwick, I., Aggleton, P, and Homans, H. Constructing commonsense – young people's beliefs about AIDS. *Social Health Illness* 10 (1988) 213
  16. Venkoba Rao, A., Swaminathan, R., Baskaran, S., Belinda, C., Andal, G., and Saleem, K. (1991). Behavior change in HIV infected subjects following health education. *Indian Journal of Medical Research, (A)* 93, 345-349
  17. Srikanth, P., John, T.J., Jeyakumari, H., Babu, P.G., Mathai, D., Jacob, M., Cherian, A.M., Ganesh, A., & Zachariah, A. (1997). Epidemiological features of acquired immunodeficiency syndrome in Southern India. *Indian Journal of medical research*, 105, 191-197.
  18. George, S., Jacob, M., John, T., J, M.K, Nathan, M., Rao, P.S.S., Richard, J., & Antoniswamy, B. (1997). A Case Control Analyses of Risk Factors in HIV transmission in South India. *Journal of Acquired Immune Deficiency Syndromes and Human Retrovirology*, 14, 290-293.
  19. Jacob, M., John, T., George, S., Rao, P.S.S., & Babu, P.G. (1995). Increasing prevalence of human deficiency virus infection among patients attending a clinic for sexually transmitted diseases. *Indian Journal of Medical Research*, 101, 6-9.
  20. Amaro, H. (1995). Love, sex and power: Considering women's realities in HIV prevention. *American Psychologist*, 50, 437-447.
  21. Aral, S.E., & Wasserheit, J.N. (1995). Interactions among HIV, other sexually transmitted diseases, socio economic status and poverty in Women. In A, O'Leary & LS, Jemmott (Eds). *Women at risk: Issues in the primary prevention of AIDS* (pp13-41). New York: Plenum Press.
  22. De, La, cancela, V. (1989). Minority AIDS prevention: Moving beyond cultural perspectives towards sociopolitical empowerment. *AIDS Education and Prevention*, 1 141-153.
  23. Mays, V.M., & Cochran, S.D. (1998). Issues in the perception of AIDS risk and risk reduction activities by Black and Hispanic/Latino women. *American Psychologist*, 43, 949-957
  24. Worth, D. (1990). Minority women and AIDS; Culture, race and Gender. In DA, Feldman (Ed). *Culture and AIDS* (pp.111-135). New York: Praeger
  25. De, Bruyn, M. (1992). Women and AIDS in developing countries. *Social science and Medicine*, 34, 249-262
  26. Faryna, E.L., & Morales, E. (2000). Self-efficacy and HIV-related risk behaviors among multiethnic adolescents. *Cultural Diversity and Ethnic Minority Psychology*, 6, 42-56.
  27. Fee, E., & Kreiger, N. (1993). Understanding AIDS: Historical interpretations and the limits of biomedical individualism. *American Journal of Public Health*, 83, 1477-1486
  28. Gupta, G., & Weiss, E. (1993). Women's lives and sex: Implication for AIDS prevention. *Culture, Medicine and Psychiatry*, 17, 399-412.
  29. Jemmott, L.S., Catan, V., Nyamathi, A., & Anastasia, J. (1995). African American Women and HIV risk reduction issues. In A, O'Leary & LS, Jemmot (Eds), *Women at risk: Issues in the primary prevention of AIDS* (pp 131-157). New York: Plenum Press.
-

## Detection of Intracellular TNF- $\alpha$ and IL-10 in CD4 and CD8 T Cells of Patients with Pulmonary Tuberculosis using a Flow Cytometer

N. Thapa <sup>1</sup>, G. A. W. Rook <sup>2</sup>, H. Donoghue <sup>2</sup>, J. L. Stanford <sup>2</sup>

<sup>1</sup> Department of Microbiology and Immunology, Kathmandu University Medical School and Department of Biotechnology, Kathmandu University, Dhulikhel, Kathmandu, Nepal

<sup>2</sup> Department of Bacteriology, Royal Free and University College Medical School, London

### Abstract

Cytokines are responsible for the regulation of cell-mediated immunity, which is impaired in tuberculosis.

The peripheral blood mononuclear cells (PBMCs) of twenty tuberculosis patients and twenty healthy controls were examined for the presence of intracellular TNF- $\alpha$  and IL-10 using a flow cytometer. They did not reveal intracellular cytokines when stimulated with mycobacterial antigens. However, large proportions of PBMCs showed intracellular cytokines when they were stimulated with Phorbol 12-Myristate 13-Acetate (PMA) and ionomycin for just four hours. IL-10 showed no differences in the cytokine profiles of CD4 and CD8 T cells of tuberculosis patients and healthy controls whereas larger proportion of CD8 T cells of tuberculosis patients showed TNF- $\alpha$  production ( $p < 0.002$ ). This suggests that there is an intricate cytokine imbalance in TB, which might have important implications for its immunopathogenesis. This finding of this study supports the need to investigate the presence of different cytokines in various cells such as CD4, CD8,  $\gamma\delta$ -T cells as well as NK cells, lymphokine-activated killer (LAK) cells and monocytes.

### Introduction

Tuberculosis results from *M. tuberculosis* that reside inside the host macrophages and overcome their defensive actions<sup>1</sup>. Effective cell-mediated immunity (CMI) requires Th1 cytokines such as IFN- $\gamma$  to activate the macrophages<sup>2</sup>. In contrast, Th2 cytokines such as IL-4 oppose the functions of Th1 cytokines (3) on macrophages and help the B cells to produce antibodies, which are ineffective against intracellular mycobacteria<sup>4</sup>. Both

inappropriate Th2 response and excessive Th1 response have been associated with immunopathogenesis of various immune disorders<sup>5</sup>. Indeed, tuberculosis patients show reduced IFN- $\gamma$  and IL-2 but increased IL-4, thus showing Th1  $\rightarrow$  Th2 shift<sup>6</sup>.

Not all cytokines have been clearly labeled, as Th1 and Th2 like IFN- $\gamma$  and IL-4 because some of them appear to be produced by both or neither Th1 and Th2 cells. For this reason, they have also been called Th0 cytokines. For the purpose of this study, it is convenient to divide the cytokines in to pro-inflammatory and anti-inflammatory types. It appears that the pro-inflammatory cytokines are closely identified with Th1 cytokines whereas the anti-inflammatory cytokines are associated with

### Correspondence to:

Dr. Navin Thapa  
Department of Microbiology and Immunology  
Kathmandu University Medical School  
PO Box 21833  
Kathmandu, Nepal  
Tel: 0977-11-664407  
Email: kums@wlink.com.np

---

Th2 cytokines. TNF- $\alpha$  and IL-10 have been used in the present investigation as the representatives of pro-inflammatory Th1 and anti-inflammatory Th2 cytokines, respectively.

TNF- $\alpha$  enhances the expression of MHC class I and class II molecules and promotes bactericidal and tumoricidal activities of NK cells and macrophages<sup>7</sup>. It can also mediate inflammation and septic shock. In tuberculosis, TNF- $\alpha$  is also involved in granuloma formation and its deficiency has been shown to result in uncontrolled BCG infection in mice<sup>8</sup>.

TNF- $\alpha$  has wide-ranging adverse effects such as acting as a pyrogen in the central nervous system<sup>8</sup> and triggering weight loss by activating the enzyme lipoprotein lipase<sup>9</sup>. Thus, TNF- $\alpha$ , which can mediate protective anti-mycobacterial immune responses locally in the site of disease, can later lead to harmful effects following their excessive production and release in to the systemic circulation. Therefore, thalidomide and other agents that lower the effects of TNF- $\alpha$ , including anti-TNF- $\alpha$  antibodies have been recommended as adjunctive therapies in tuberculosis<sup>10</sup>.

IL-10 can also enhance B cell proliferation and antibody secretion. IL-10 can reduce macrophage functions such as antigen presentation by inhibiting the expression of MHC molecules. IL-10 has been found to cause rapid deterioration of mice infected with *M. avium* as well as to inhibit the macrophage antimycobacterial effect *in vivo*<sup>11</sup>.

## Materials & Methods

### COLLECTION OF BLOOD & SEPARATION OF PBMC

20 mls of peripheral blood samples were collected using standard procedures in heparinated tubes from 20 healthy subjects and 20 patients with pulmonary tuberculosis from University College London Hospitals. The blood was centrifuged at 3000 rpm for 10 minutes. The supernatant or plasma was removed using a sterile pasteur pipette.

Remaining blood cells were divided equally in two universals. The culture medium (RPMI-1640 supplemented with 2mM glutamine, 100 U/ml penicillin, 100 mg/ml streptomycin) was added to both universals so their total volume was about 18 ml in each. Blood diluted in RPMI was then gently layered over 9 ml Ficoll-Hypaque solution in universal tubes. The PBMCs were separated by centrifuging on Ficoll-Hypaque at 1800 rpm for 28 minutes. The PBMC layer between the RPMI and red blood cell layers was removed using a sterile pasteur pipette. PBMC were washed by centrifuging in 20 ml of RPMI at 1500 rpm for 10 minutes. The supernatant was poured off and the pellet was flicked to spread the cells. The cells were diluted in 20 ml of RPMI; 100  $\mu$ l of this cell suspension was mixed with an equal volume of trypan blue, and the cells were counted using a haemocytometer. One drop of autologous plasma was added to the cell suspension and then spun at 1000 rpm for 10 minutes. The supernatant was poured off; the pellet was flicked and the cells were suspended in suitable volumes of RPMI with 20% autologous plasma to give  $4 \times 10^6$  cells/ml.

### STIMULATION

$2 \times 10^6$  PBMC in 0.5 ml of RPMI were mixed with an equal volume of double strength Phorbol-12-Myristate 13-Acetate (PMA) + ionomycin + monensin (Sigma) to give final concentrations in the culture of 10 ng/ml, 2.0  $\mu$ g/ml and 3.0  $\mu$ M respectively, and incubated for 4 hours.

### STAINING, FIXATION & REMOBILIZATION

Fresh PBMC or PBMC cultured with stimulants were recovered, put in Falcon LP2 tubes, washed in staining buffer (PBS/1%BSA), and harvested by centrifugation at 3000 rpm for 5 minutes. The supernatant was removed by vacuum suction and the pelleted cells were suspended in 50  $\mu$ l of staining buffer.

Cells were fixed with 50  $\mu$ l of solution A fixing solution from Caltag) at room temperature for 15 minutes; washed in staining buffer as



described above; permeabilised in 50 µg/ml of solution B (permeabilising solution from Caltag) with 2 µλ of anti-cytokine Mab (Pharmingen) and 3 µλ of anti-CD4 (DAKO) and anti-CD8 Mabs (DAKO) at room temperature for 30 minutes.

The specificity of the staining technique used for the detection of intracellular IFN-γ and IL-4 in the CD4 and CD8 T cells was confirmed by including the nonspecific isotype-matched control and anti-cytokine monoclonal antibodies in unstimulated cells. In addition, unlabelled anti-cytokine antibodies were used for neutralisation of the cytokines and recombinant TNF-α and IL-10 were used for competitive inhibition of staining.

Next, the stained cells were washed in staining buffer as described above; and finally suspended in 500 µλ of 0.2% paraformaldehyde solution.

#### FIXATION & ANALYSIS

The pelleted cells were finally suspended in 500 µλ of fixing buffer (4% paraformaldehyde/PBS/0.1% sodium azide) and run through the fluorescence-activated cell scanner (FACS) within 48 hours.

The FACS was operated using the Hewlett Packard software. The machine was set to its optimum instrumentation settings (scatter detector and amplifier, threshold and compensation) using previously set parameters. The threshold was set with the forward scatter at 100. Lymphocyte cell populations were gated and information for 10,000 cell events were stored. The data files were read using the Hewlett Packard reader software. Dotplots and histograms were plotted for three parameters and the % of cells with intracellular cytokines were calculated.

#### Results

IL-10 production by PBMCs stimulated with PMA + ionomycin showed no differences between CD4 and CD8 T cells of healthy subjects and tuberculosis patients but IL-10 production by CD8 T cells was higher amongst tuberculosis patients (see the tables below). Proportions of cells producing

TNF-α was higher amongst CD4 T cells whereas the proportions of cells producing IL-10 were higher amongst CD8 T cells in healthy subjects and healthy controls.

**Table 1: Cytokines in PMA+ ionomycin stimulated CD4 T cells:**

Cytokines in % CD4 T cells	TB patients (n=20)	Healthy controls (n=20)	Statistical significance*
TNF-α	48+/-9	52+/-10	Not significant
IL-10	38+/-10	42+/-10	Not significant

**Table 2: Cytokines in PMA + ionomycin stimulated CD8 T cells:**

Cytokines in % of CD8 T cells	TB patients	Healthy controls	Statistical significance*
TNF-α	39+/-12	28+/-9	P<0.002
IL-10	50+/-16	58+/-11	Not significant

\* Using Mann-Whitney test

#### Discussion

Our results showed that IL-10 production was raised amongst CD8 T cells of tuberculosis patients where as the TNF-α production was similar in the two groups. There are contradicting reports of anti-mycobacterial potency conferred by different cytokines such as TNF-α and IL-10. TNF-α and IFN-γ, predominant in Th1 response, have anti-mycobacterial macrophage activating roles which have been reported to show a synergistic effect in mice<sup>12</sup>. There are also reports claiming that no combination of cytokines has been shown to confer total mycobactericidal capacity on human macrophages in vitro<sup>13</sup> unlike their counterparts in mice. Murine macrophages produce reactive nitrite intermediates (RNI) such as NO (nitric oxide) in response to TNF-α which are seen to kill *M. tuberculosis in vitro*<sup>14</sup>. In absence of effective killing of *M. tuberculosis in vivo*, the main roles of cytokines

---

might be to mediate tissue damaging effects (14a).

The ratio of Th1/Th2 or other subtle cytokine balance might be important in modulating the cytotoxic function of TNF- $\alpha$  which may destroy mycobacteria as well as cause damage to self-tissues. The balance between these two function may be dependent upon other cytokines. Some researchers have found that TNF- $\alpha$  causes relatively little tissue damage in the presence of a pure Th1 cytokine pattern in mice but a necrotic T-cell-mediated inflammatory response results from a mixed Th1+Th2 cytokine pattern <sup>15</sup>.

Particular cytokine patterns might also optimize cytolytic activities of different lymphocytes such as NK cells, LGL and cytotoxic T cells. These lymphocytes can lyse macrophage with a low anti-mycobacterial potential. The lysis process itself might be a double-edged sword so that cytolysis in the presence of unfavourable cytokines might result in tissue damage. Inflammatory cytokines, such as TNF- $\alpha$ , have also been found to be elevated in more severely affected lesions as shown by high resolution computed tomography <sup>15</sup>

Paradoxically, the presence of IL-10 in tubercular pleurisy has been seen as favourable<sup>16</sup> as it has been reported to mediate a protective response in tubercular pleurisy by suppressing mycobacterial growth in macrophages and activating T cells if it is present before stimulation by mycobacteria produces IFN-gamma <sup>17</sup>. Therefore, it is not possible to categorise a single cytokine as being protective or non-protective. The correlation of protective and unfavourable immune responses with Th1 and Th2 responses, respectively, might be a gross simplification. *M. tuberculosis* may require a specific manner of killing with relevant effector cells conditioned with specific activation signals such as cytokines, induced in a different order and in different amounts and combinations<sup>18</sup>. For example, TNF-alpha lysed *M.tuberculosis* infected macrophages but no individual cytokines were found better at

altering growth of *M. tuberculosis in vitro* so a combination might be more potent<sup>19</sup>. There might be optimal ratios of different cytokines, such as the ratio of IL-10 to IFN-gamma or IL-2 is thought to determine if the eventual type of response becomes protective or ineffective<sup>20</sup>. Both TNF- $\alpha$  and IL-10 can be produced by macrophages which can affect the types of Th cells selected<sup>21</sup>. In addition, IL-12 can also activate  $\gamma\delta$ -T cells and NK cells<sup>22</sup> so they can secrete macrophage activating factors to kill intracellular *M. tuberculosis* (1). IL-12 as well as IL-18 have been found to potentiate Th1 pathway<sup>23</sup>. Mycobacteria reacting with antigen-presenting cells produce a rich milieu of cytokines which act as potent activators of T cells in contrast to using a particular cytokine such as TNF- $\alpha$  or IL-10 <sup>24</sup>. Also, the cells which secrete a combination of cytokines might be suited for especial function compared to cells which produce them separately. Therefore, the investigation of multiple cytokines in different cells might show important results.

#### References:

1. Tsuyuguchi, I. Immunology of tuberculosis and cytokines. *Kekkaku*, 1995; 70(5): 335-46
2. Romagnani, S. Lymphokine production by human T cells in disease states. *Ann Rev Immunol*, 1994; 12, 227-57
3. Parronchi P, De Carli, M, Manetti, R, Simonelli, C, Sampognaro, S, Piccinni, MP, Macchia, D, Maggi, E, Del Prete, G, Romagnani, S. IL-4 and IFN (alpha and gamma) exert opposite regulatory effects on the development of cytolytic potential by Th1 or Th2 human T cell clones. *J Immunol*, 1992; 149(9):2977-83
4. Abbas, AK, Lichtman, AH and Pober, JS. Cellular and Molecular Immunology 3<sup>rd</sup> Edition (1997) Saunders Text and Review Series. Chapter 16: Immunity to Microbes, p. 346
5. Janeway, C.A., Travers, P., Walport, M. and Shlomchik, M. Immunobiology, 5<sup>th</sup> edition (2001), Garland Publishing. Chapter 12: Allergy and Hypersensitivity, p. 493-6.

- 
6. Talreja, J, Bhatnagar, A, Jindal, SK, Ganguly, NK. Influence of Mycobacterium tuberculosis on differential activation of helper T-cells. *Clin Exp Immunol*. 2003;131(2):292-8
7. Kindler, V, Sappino, AP, Grau, GF, Piguët, PF and Vassalli P. The inducing role of tumour necrosis factor in the development of bactericidal granulomas during BCG infection. *Cell*,1989; 56(5), 731-40
8. Dinarello, CA, Cannon, JG, Wolff, SM, Bernheim, HA, Beutler, B, Cerami, A, Figari, IS, Palladino, MA, Jr. and O'Connor, JV. Tumour necrosis factor (cachectin) is an endogenous pyrogen and induces production of interleukin 1. *J Exp. Med*, 1986; 163(6), 1433-50
9. Beutler, LE and Cerami, A. Cachectin: more than a tumour necrosis factor. *N. Engl. J Med*, 1987; 316: 379-85.
10. Nawroth, PP and Stern, DM. Modulation of endothelial hemostatic properties by tumour necrosis factor. *J Exp. Med*, 1986; 163 (3), 740-5.
11. Bermudez, LE and Champsì, J. Infection with Mycobacterium avium induces production of interleukin-10, and administration of anti-IL-10 antibody is associated with enhanced resistance of infection in mice. *Infect Immun*, 1993; 61(7), 3093-7.
12. Flesch, IE and Kaufmann, SH. Role of cytokines in tuberculosis. *Immunobiology*, 1993; 189 (3-4), 316-39
13. May, ME and Sapangolo, PJ. Evidence for activation of respiratory burst in the interaction of human neutrophils with Mycobacterium tuberculosis. *Infect Immun*, 1987; 55, 2304-7.
14. Nathan, CF and Hibbs, JB, Jr. Role of nitric oxide synthesis in macrophage antimicrobial activity. *Curr Opin Immunol*, 1991; 3 (1), 65-70
15. Casarini, M, Ameglio, F, Alemanno, L, Zangrilli, P, Mattia, P, Paone, G, Bisetti, A and Giosue S. Cytokine levels correlate with a radiologic score in active pulmonary tuberculosis. *Am J Respir Crit Care Med*, 1999; 159(1):143-8
15. Hernandez-Pando, R and Rook, GA. The role of TNF- $\alpha$  in T-cell-mediated inflammation depends on the Th1/Th2 cytokine balance. *Immunobiology*, 1994; 82(4), 591-5
16. Barnes, PF, Lu, S, Abrams, JS, Wang, E, Yamamura, M and Modlin RL. Cytokine production at the site of disease in human tuberculosis. *Infect Immun*, 1993; 61(8):3482-9
17. Orme, IM, Miller, ES, Roberts, AD, Furrey, SK, Griffin, JP, Dobos, KM, Chi, D, Rivoire, B and Brennan, PJ. T lymphocytes mediating protection and cellular cytotoxicity during the course of Mycobacterium tuberculosis infection. Evidence for different kinetics and recognition of a wide spectrum of protein antigens. *J Immunol*, 1992; 148(1), 189-96
18. Zerlauth, G, Eibl, MM and Mannhalter, JW. Induction of anti-mycobacterial and anti-listerial activity of human monocytes requires different activation signals. *Clin Exp Immunol*, 1991; 85(1), 90-7.
19. Denis, M, Gregg, EO and Ghandirian, E. Cytokine modulation of Mycobacterium tuberculosis growth in human macrophages. *Int J Immunopharmacol*, 1990; 12(7):721-7
20. Katsikis, PD, Cohen, SB, Lodi, M and Feldmann, M. Are CD4+ Th1 cells pro-inflammatory or anti-inflammatory? The ratio of IL-10 to IFN-gamma or IL-2 determines their function. *Int. Immunol*, 1995; 7(8), 1287-94
21. Conrad, P and Kaufmann, SH. Impact of antigen-presenting cells on cytokine profiles of human Th clones established after stimulation with Mycobacterium tuberculosis antigens. *Infect Immun*, 1995; 63(5):2079-81
22. Denis, M. Interleukin-12 (IL-12) augments cytotoxic activity of natural killer cells toward Mycobacterium tuberculosis-infected human monocytes. *Cell Immunol*. 1994; 156(2):529-36
23. Vankayalapati, R, Wize, B, Weis, SE, Samten, B, Girard, WM and Barnes, PF. Production of interleukin-18 in human tuberculosis. *J Infect Dis*, 2000; 182(1):234-9
24. Cheadle, EJ, Selby, PJ and Jackson, AM. Mycobacterium bovis bacillus Calmette-Guérin-infected dendritic cells potently activate autologous T cells via a B7 and interleukin-12-dependent mechanism. *Immunology*, 2003; 108(1):79-88
-

## Gender differences in perceived health related quality of life among persons living with HIV

Beena Elizabeth Thomas<sup>1</sup>, Josephine Arockiaselvi<sup>1</sup>, Suryanarayanan D<sup>2</sup>, Fathima Rehman<sup>2</sup>, Padmapriyadarsini<sup>1</sup>, Soumya Swaminathan<sup>1</sup>

<sup>1</sup>Division of HIV/AIDS, <sup>2</sup>Department of Statistics, Tuberculosis Research Centre (ICMR), Chennai, India

### Abstract

In the era of HIV/AIDS and in the context of the developing world HIV/AIDS has led to a pandemic. HIV antiretroviral drugs are inaccessible and unaffordable and the only choice that health care providers have is to work towards improving the quality of life of individuals as long as they live with this dreaded disease. This study on 203 seropositive individuals, 102 women and 101 men, was undertaken to find out the differences in the quality of life perceived by women and men living with HIV/AIDS. The WHOQOL-BREF scale was used to assess the quality of life.

The findings from this study reveal that men report a poor quality of life in the psychological domain ( $p < 0.01$ ) while women in the sociological domain ( $p = 0.03$ ). The stage of illness does not seem to influence quality of life among women and men. The findings emphasize the need for health providers to assess the QOL among people living with HIV/AIDS. This information would be helpful in planning effective intervention strategies for men and women living with HIV/AIDS in order to be ensured of a quality of life.

**Key words:** Quality of life, HIV/AIDS, Gender, and Domains.

### Introduction

The scourge of HIV/AIDS in the developing world has led to a pandemic. On the one hand the numbers of those infected are on the rise, families are being wiped away, the psychosocial factors that accompany the disease are many and the impact of this diseases is felt not only by the individual, but his family and in the larger context, society. On the other hand is the inaccessibility and unaffordability of antiretroviral drugs. Although the virus and its concurrent maladies drain physical resources from individuals, a

psychological and social cost is also incurred. The only choice therefore that health providers have is to concentrate on improving the quality of life of infected persons for as long as they live with the dreaded disease. This could have a positive ripple effect on their families and others who are affected by this disease. Research on the association of HIV and QOL, is still in its infancy. The concept of health related quality of life (HRQOL) can be traced to 1947 and the World Health Organization's definition of health as a "state of complete physical and mental and social well being and not merely the absence of infirmity"<sup>1</sup>. Health care professionals therefore are encouraged to become familiar with the predictors of HRQOL, which may eventually contribute to the development of multiple entry points for interventions in promoting QOL. The term QOL is used synonymously with HRQOL.

There have been studies on QOL which have outlined the major aspects of QOL which include physical, social, emotional and

### Correspondence to:

Dr. Soumya Swaminathan  
Deputy Director, Division of HIV / AIDS  
Tuberculosis Research Centre, (ICMR)  
Chetpet, Chennai, India.  
Telephone: +91 44 2836 2442 (Direct) /2836  
2432/33/34/35  
Fax: +91 44 2836 2528/29  
Email: [beenaelli@hotmail.com](mailto:beenaelli@hotmail.com)  
[doctorsoumya@yahoo.com](mailto:doctorsoumya@yahoo.com)

---

cognitive functioning; mobility and self-care: patient perception of health: and symptoms<sup>2,3,4</sup>. It has also been found that an assessment of HRQOL has found to enhance communication between patients and providers<sup>5</sup>. In the developed world given the longevity achievable with current prophylactic and therapeutic strategies for persons with HIV infection, quality of life (QOL) has emerged as a significant medical outcome measure and its enhancement an important goal. There have been a few studies that have examined the construct of QOL within a HIV population most of which have focused on gay and bisexual men<sup>6, 7</sup>. There are other studies that have examined QOL in diverse samples of people living with HIV/AIDS<sup>8, 9</sup> (PLWHA). However a negligible number of females were represented in the samples in these studies. There is dearth of information from India in this regard. Since the importance of QOL has found to be important in the management of HIV it is important to understand the quality of life among PLWHA. It is also important to view it from a gender perspective in order to evolve gender sensitive strategies in order to improve QOL. It is with this objective that this study has been planned.

## Methods

This study was carried out in Chennai the capital of Tamilnadu State, in south India. Chennai is the fourth largest metropolitan city in India and is located on the East coast, and spreads over an area of 216 sq. kms<sup>10</sup>. The study site was the Tuberculosis Research Centre (TRC) and the sexually transmitted diseases (STD) outpatient clinic attached to the Government General Hospital (GH).

The design used is a period cohort design, on a cohort of patients attending the out patient clinic of the TRC and the STD clinic of the GH, Chennai during March 2000 to July 2003.

## Study population

The study population consisted of 203 of 220 HIV-positive patients enrolled in a clinical trial on tuberculosis chemoprophylaxis during the

period March 2000 to July 2003. There were 102 women and 101 men. The study respondents were referred for the clinical trial from the STD clinic of the Government General Hospital, antenatal clinics and Non-Governmental Organizations (NGOs). The respondents were from the lower socio-economic strata of society.

Inclusion criteria for the present study included:

- (1) Documented evidence of HIV seropositive status,
- (2) Ability and willingness to provide informed consent and
- (3) Willingness to spare the time for the interview.

## Tools for data collection

A semi structured interview schedule was used to collect basic demographic information from the respondents. Quality of life was measured using the WHOQOL-BREF<sup>11</sup> (WHOQOL BREF, 1996). This is a 26- item scale, which is a brief version of the original WHOQOL-100, a 100- item scale and has four domains. The main domains studied were a) physical b) psychological c) sociological d) and environmental. The domain scores are scaled in a positive direction (higher scores denote higher quality of life). The mean scores are then used to calculate the domain score. The reliability in this study was 0.89 (coefficient alpha). The scores were classified as poor, moderate and good. For the purpose of the analysis, moderate and good was combined, as the number of those who reported good was negligible. This tool has been used in India<sup>12-13</sup>.

The scale was translated to Tamil and given to two professional social workers with sound knowledge of Tamil, to assess if the items retained the essence of the original items and based on their feedback the items were

---

modified. The questionnaire and scales were pilot tested on HIV positive respondents attending the STD clinic of the GH before the commencement of the study.

The questionnaire and scale were administered after getting informed consent from the participant and after explaining the time required for the interview. The interview was done in Tamil at the clinic both at the Government Hospital and the TRC. Care was taken to assure privacy and confidentiality. Each interview lasted for 45 minutes to one hour.

Data was collected over a 6-month period from July 2003 to December 2003.

### *Data analysis*

The data was checked for accuracy and computerized. All the statistical analysis was carried out using SPSS 10.5 and Epi Info 6.0. Univariate and multivariate analysis were done by gender. Chi square analysis was carried out to test the differences in proportions of genders and association in contingency tables.

## **Results**

*Base line characteristics of the respondents (102 women, 101 men):*

The base line profile of the respondents is presented in Table I.

Sixty seven percent of the women were in the age group of 15-29 years compared to 26% of the men. Twenty-two percent of the women were illiterates as compared to 12% of the men. Eighty percent of the women had an income of less than Rupees 1000 per month as compared to 24% of the men. More than half the women respondents were housewives and not employed outside the home. Thirty one percent of the men were truckers. Forty four percent of the women and 7% of the men were widowed.

Seventy nine percent of the women and 50% of the men had CD4 counts above 200/mm<sup>3</sup>. CD<sub>4</sub> was reported as the absolute number (per cubic millimeter of peripheral blood) of CD<sub>4</sub> T Lymphocytes.

### **Quality of life of 203 respondents**

Quality of life was measured under four domains: physical, psychological, sociological and environmental. While there were no significant differences between the women and men respondents in the physical and environmental domains, a significantly higher proportion of men (26%) compared to women (12%) had a 'poor' quality of life in the psychological domain ( $p < 0.01$ ). A significantly higher proportion of women (57%) compared to men (40%) had a 'poor' quality of life in the sociological domain ( $p = 0.03$ ). (Table II)

Twenty-one (21%) of women and 51(50%) men had CD<sub>4</sub> counts less than 200. Twenty (95%) of these women had a moderate or above moderate quality of life and 44 (86%) of the men had a moderate or above moderate quality of life. The difference is not statistically significant. (Table III).

A multivariate analysis of the baseline characteristics revealed that family type, age, income, marital status did not seem to influence QOL. (Data not tabulated).

Table I: Baseline characteristics of the HIV positive respondents  
(102 women, 101 men)

Baseline characteristics	Women		Men	
	Number	%	Number	%
Age*				
15 – 29	68	67	26	26
30 – 44	33	32	67	66
> 45	1	1	8	8
Education				
Nil	22	22	12	12
Primary	21	21	17	17
Middle	36	35	42	42
Secondary	14	14	24	24
University	9	9	6	6
Income* (Rupees per month):				
≤ 1000	82	80	24	24
> 1000	20	20	77	76
Marital status				
Married	50	49	68	67
Widow/Widower	45	44	7	7
Single	2	2	24	24
Separated/Divorced	5	5	2	2
Occupation				
House wife/ Unemployed	53	52	9	9
Drivers	0	0	31	31
Skilled	25	25	28	28
Unskilled	24	23	33	33
Religion				
Hindu	85	83	83	82
Muslim	4	4	4	4
Christian	13	13	14	14
Stage of the disease				
CD <sub>4</sub> < 200	21	21	51	50
CD <sub>4</sub> ≥ 200	81	79	50	50
Type of family				
Joint	47	46	45	45
Nuclear	55	54	56	55

\* p < 0.001

Table II: Quality of life in four domains (102 women, 101 men)

Quality of life Domains	Women		Men		p value
	Number	%	Number	%	
Physical domain					
Moderate	94	92	88	87	0.34
Poor	8	8	13	13	
Psychological domain					
Moderate	90	88	75	74	<0.01
Poor	12	12	26	26	
Sociological domain					
Moderate	44	43	60	59	0.03
Poor	58	57	41	41	
Environmental domain					
Moderate	73	72	78	77	0.45
Poor	29	28	23	23	

Table III: CD<sub>4</sub> and QOL (102 women, 101 men)

CD <sub>4</sub> count	Quality of life			
	Women Moderate or good	Poor	Men Moderate or good	Poor
<200/cmm	20 (95%)	1 (5%)	44 (86%)	7 (14%)
≥ 200/cmm	75 (93%)	6 (7%)	49 (98%)	1 (2%)

## Discussion

This study has brought out the differences in the quality of life experienced among women and men living with HIV. An examination of gender differences revealed a difference in two domains of the quality of life, the psychological and sociological domain. Psychological domain addressed issues such as lack of concentration, negative feelings of depression, anxiety and despair. Sociological domain dealt with issues related to satisfaction in personal relationships and social support. Men significantly reported poor QOL in their psychological functioning as compared to women. This seems contradictory to what is generally believed that HIV positive women report more psychological distress than men<sup>14-16</sup>. A survey in a group of largely poor, black and Hispanic women showed that they were

affected more by anxiety and depression and both correlated with poorer quality of life<sup>17</sup>.

The reasons for this poor quality of life in their psychological functioning among HIV positive men could be many and need to be explored further. Chronic illness and disease are sources of tremendous amounts of stress that tend to fluctuate over the course of time such that people living with chronic illness experience distress along a number of dimensions that impact quality of life<sup>18-21</sup>. The effects of depression have also been reported in other studies, which have documented the impact of depression on quality of life for both men and women<sup>22-24</sup>. Men infected with HIV, because of their inability to work and support the family, their guilt, their feelings of insecurity and dependence on others, could experience psychological distress leading to depression contributing to poor psychological functioning.



---

However more studies are required to come to broad based conclusions.

Women on the other hand significantly reported poor functioning in the sociological domain. The reason why women have reported a worse social functioning could be a reflection of the stigma they face, whether actual or perceived. This could prevent them from socially networking with others, which is important in getting the social support in handling the disease. An earlier study from Mumbai, that reported that there was a gender disparity in social support received from families for those infected with HIV with men receiving more positive support<sup>25</sup>. The importance of social support networks in maintaining overall psychological and physical health has been brought out by several studies<sup>26-35</sup>. Social support also acts as a resource providing encouragement to the recipient and promotes health protection and feelings of personal efficacy<sup>36-37</sup>. Another study from India<sup>13</sup> has revealed that individuals who felt a stronger need to disclose had a better QOL particularly in the social domain reflecting good social relationships in this group. However gender differences were not studied. The importance of social networking leading to social support seems to be an important factor influencing QOL among women living with HIV/AIDS.

Another interesting finding of this study is that the stage of illness measured by CD<sub>4</sub> did not seem to influence QOL. Among those who had CD<sub>4</sub> counts less than 200 cells/mm<sup>3</sup> the majority of the women and men had a moderate or good QOL. This has not been a focus of study in the management of HIV/AIDS and needs to be explored further. It is not only important to concentrate on the clinical management for those living with HIV/AIDS but it is of crucial importance to address psychosocial factors as well in order to ensure a better QOL for PLWHA.

## Conclusions

There are gender differences in the perceived health related quality of life among people living with HIV/AIDS. This difference is seen in two areas, the psychological and sociological domain. Another interesting finding is that the stage of illness does not influence the quality of life.

These findings reiterate the fact that QOL of PLWHA needs to be focused by all health providers irrespective of the stage of illness. This calls for a proper team functioning with clinicians, social workers, psychologists, nurses and other paramedical workers. QOL needs to be assessed at different time points in order to assure that proper intervention strategies are adopted at the right time, whether it be clinical or psychosocial management of the infected individual. This is important for PLWHA can be assured of a fairly good quality of life despite HIV.

## Limitations

This study presents only an outline of the QOL among women and men living with HIV/AIDS. Interpretations of the results of this study are limited as it is a one-point interview and this furthermore limits the ability to make direct causality of the relationship of various psychosocial factors to QOL. Future studies in this area need to use a longitudinal research design to suggest possible causal relationships of various psychosocial factors influencing QOL. Another limitation is restricting the study sample to those individuals who volunteered to be a part of a larger research study. Therefore this sample is not likely to be representative of all persons living with HIV and AIDS.

## Acknowledgements

We thank the staff of the STD Department of the Government Hospital, Chennai, for their support in conducting the study. Our gratitude to Dr. P. R. Narayanan, Director, Tuberculosis Research Centre (TRC) for his constant

---

encouragement and support. We would also like to acknowledge, Dr. Venkatesan, Head of the statistical department for his statistical guidance and advice.

This study would not have been possible if it were not for our HIV friends who responded without inhibitions reflecting their trust in us. The various insights that they provided have helped in making the study possible for which we are deeply grateful. For their sake and for the millions who suffer like them we hope this world would be a better place for them to live in...

## References

1. WHO. (1948). The constitution of WHO. Geneva, Switzerland
2. Shumaker, S.A., and Waughton, M.J. (1995). *The international assessment of health-related quality of life: a theoretical perspective*. In: Shumaker Oxford, England: Rapid Communications.
3. Vanhems, P., Toma, E., and Pineault, R. (1996). Quality of life assessment and HIV infection: a review. *Eur J Epidemiol*, 12, 221-228
4. Wu, A.W., and Rubin, H.R. (1992). Measuring health status and quality of life in HIV and AIDS. *Psych Health*, 6, 251-264
5. Detmar, S.B., Muller, M.J., Schomaged, J.H., Wever, L.D., Aaronson, N.K. (2002). Role of health-related quality of life in palliative chemotherapy treatment decisions. *Journal of Clinical Oncology*, 15; 20(4), 1056-62
6. Burgess, A., Deyer, M., Catalan, J., Hawkins, D., and Gazzard, B. (1993). The reliability and validity of two HIV-specific health-related quality of life measures. *AIDS*, 7, 1001-1008
7. Cunningham, W.E., Hays, R.D., Williams, K.W., Beck, K.C., Dixon, W.J., & Shapiro, M.F. (1995). Access to medical care and health-related quality of life or low-income persons with symptomatic human immunodeficiency virus. *Medical care*, 33, 739-754
8. Hays, R.D., Cunningham, W.E., Sherbourne, C.D., Wilson, I.B., Wu, A.W., Cleary, P.D., McCaffrey DF., Fleishman J.A., Crystal S., Collins R., Egan F., Shapiro M.F., Bozzette S.A. (2000). Health-related quality of life in patients with human immunodeficiency virus infection in the United States: Results from the HIV Cost and Services Utilization Study. *American Journal of Medicine*, 108, 714-722
9. Lorenz, K.A., Shapiro, M.F., Asch, S.M., Bozzette, S.A., & Hays, R.D. (2001). Associations of symptoms and health-related quality of life: Findings from a national study of persons with HIV infection. *Annals of Internal Medicine*, 134, 854-860
10. Census of India. (2001). Registrar general and census commissioner, India. <http://www.censusindia.net>
11. WHO QOL BREF. (1996). Introduction, Administrative Scoring & Generic version of the Assessment. Field trial version, Dec 1996. Programme on mental health WHO, Geneva
12. Chandra, P.S. (1999). Quality of life in HIV/AIDS In: Chaturvedi SK, Chandra P, editors. *Proceedings of the first symposium and workshop on quality of life in health and disease*. India: Bangalore, 36-44
13. Chandra, P.S., Subbarathna, A.R., Sudha, M.B., Deepthivarma, S., Krishna, V.A.S., Manjula, V. (2002). *Psychosocial and Sexual adjustment among persons Living with HIV*. A study conducted at the HIV counseling clinic at NIMHANS, Bangalore, India
14. Franke, G.H., Jaeger, H., Thomann, B., & Beyer, B. (1992). Assessment and evaluation of psychological distress in HIV-infected women. *Psychology and Health*, 6, 29-312
15. Kennedy, C.A., Skunick, J.H., Foley, M., & Louria, D.B. (1995). Gender differences in HIV-related psychological distress in heterosexual couples. *AIDS Care*, 7, S33-S38.
16. Rabkin, J.G., Johnson, J., Lin, S., & Lipsitz, J.D. (1997). Psychotherapy in male and female HIV-positive and negative injecting drug users: Longitudinal course over 3 years. *AIDS*, 11, 507-515
17. Van Servellen G, Sama L, Nyamathi A, et al. (1997). *Symptom management, symptom distress and emotional well being in women with AIDS*. In; Program and abstracts of the National conference on Women and HIV: May 4-7, Pasadena, Calif, Abstract 216.3

- 
18. Antoni, M.H., Goodkin, K., Goldstein, D., LaPerriere, A., Ironson, G., & Fletcher, M.A. (1991). Coping responses to HIV-1 serostatus notification predict short-term and long-term affective distress and one-year immunologic status in HIV-1 seronegative and seropositive gay men. *Psychosomatic Medicine*, 53, 227(Abstract).
19. Bloom, D.E., and Carliner, G. (1988). The economic impact of AIDS in the United States. *Science*, 239, 604-610
20. Martin, S.L. (1988). Psychological consequences of AIDS-related bereavement among gay men. *Journal of Consulting and Clinical Psychology*, 56, 856-862.
21. Redfield, R.R., and Burke, D.S. (1988). HIV infection: The clinical picture. *Scientific American*, 259, 90-98
22. Holmes, W.C., Bix, B., Meritz, M., Turner, J., & Hutelmyer, C. (1997). Human immunodeficiency virus (HIV) infection and quality of life in persons with HIV psychiatric disorders in a sample of 95 HIV seropositive men. *Psychosomatic Medicine*, 59:187-192
23. Sherbourne, C.D., Hays, R.D., Fleishman JA, Vitiello B., Magruder K.M., Bing, E.G., & McCaffrey, D., & Burnam, A., & Longshore, D., & Eggen, F., Bozzette, S.A., & Shapiro, M.F. (2000). Impact of Psychiatric Conditions on Health-Related Quality of Life in Persons With HIV Infection. *American Journal of Psychiatry*, 157, 248-254
24. Ling, S.U., Moore, R.D., Keruly, J.C., et al. (1998). *Depression, social support, and quality of life in HIV patients*. In: Program and abstracts of the 12<sup>th</sup> World AIDS Conference; June 28-July 3, Geneva. Abstract, 14343.
25. Bharat, S., and Aggleton, P. (1999). Facing the challenge: household responses to AIDS in Mumbai, India. *AIDS Care*, 11, 31-44
26. Broadhead, W.E., Kaplan, B., James, S., Wagner, E., Schoenbach, U., Grimson, R., & Heydon, S., & Tibblin, G., & Gehlbach, S. (1983). The epidemiological evidence for relationship between social support and health. *American Journal of Epidemiology*, 117, 521-537
27. Cohen, S. (1998). Psychological models of the role of social support in the etiology of physical disease. *Health Psychology*, 7, 269-297
28. Cohen, S.C., & McKay, G. (1984). Social support stress and the buffering hypothesis: A theoretical analysis. In A. Baum, S.E. Taylor, and J.E. Singer (Eds), *Handbook of Psychology and Health*, 4, 253-267. Hillsdale, NJ; Erlbaum
29. Cohen, S., and Syme, S.L. (Eds). (1985). *Social Support and Health*. Orlando: Academic press.
30. Cohen, S., and Willis, T.A. (1985). Stress, social support and the buffering hypotheses. *Psychological Bulletin*, 98, 310-357
31. Dixon, D., Antoni, M., Kilbourn, K., Wagner, S., Schneiderman, N., Klimas, N., & Fletcher, M.A.(1998). Social support buffers PTSD symptoms and HHV-6 antibody tiers in HIV+ gay men following Hurricane Andrew. *NeuroImmuno Modulation*, 6, 214
32. Leserman, J., Jackson, E., Pettitto, J., Golden, R., Silva, S., Perkins, D., & Cai, J., & Folds, J., & Evans, D.L. (1999). Progression to AIDS; The effects of stress, depressive symptoms and social support. *Psychosomatic Medicine*, 60, 204-214
33. Penninx, BWJH., Tilburg T van., Boeke, A.J.P., Deeg, D.J.H., Kreigsman, D.M.W., & Eijk, JTM van. (1998). Effects of social support and personal coping resources on depressive symptoms; Different for various chronic diseases? *Health Psychology*, 17, 551-558
34. Wortman, C.B. (1984). Social support and the cancer patient; Conceptual and methodological issues. *Cancer*, 53, 2339-2362
35. Northhouse, L. (1988). Social support in patients and husbands' adjustment to breast Cancer. *Nursing Research*, 37, 91-95
36. Muhlenkamp, A.F., and Sayles, J.A. (1986). Self esteem, social support and positive health practices. *Nursing Research*, 35, 334-338
37. Kobasa, S.C., Maddi, S.R., Pucetti, M.C., & Zola, M. (1985). Effectiveness of hardiness, exercise and social support as resources against illness. *Journal of Psychosomatic Research*, 29, 525-533.
-

## The Proportions of CD4, CD8, CD3 T Cells in Peripheral Circulation of Patients with Pulmonary Tuberculosis

N. Thapa<sup>1</sup>, P. Lydyard<sup>2</sup>, G. A. W. Rook<sup>3</sup>, J. L. Stanford<sup>3</sup>

*1 Department of Microbiology and Immunology, Kathmandu University Medical School and Department of Biotechnology, Kathmandu University, Kathmandu, Nepal*

*2 Department of Immunology, 3 Department of Bacteriology, Royal Free and University College London Medical School, London, UK.*

### Abstract

The cell surface markers have become useful guides for the identification of lymphocytes as well as their functions. Some major surface markers have become synonymous with the names of the cells such as CD3, CD4 and CD8 molecules which form the receptors responsible for antigen recognition and signal transduction. Probable changes in the proportions of these cells might affect the immunopathological events in pulmonary tuberculosis were investigated.

It is known that HIV+ve patients show reduction in absolute numbers as well as relative proportions of their CD4 T cells. In the present investigation, the proportions of CD4, CD8 and CD3 T cells were calculated in HIV-ve TB patients using a fluorescence-activated cell scanner (FACS). In fact, the proportion of CD4 T cells out of CD3 T cells and the proportion of CD3 T cells out of total lymphocytes were found to be both reduced significantly.

### Introduction

The main aim of this study was to simply identify the cell surface markers (CD4, CD8 and CD3) which were changed as a result of pulmonary tuberculosis in HIV negative subjects. The investigation of different cell phenotypes might lead to the identification of the main immune cells involved in immunopathology of pulmonary tuberculosis. The expansion in number of some cells might result from clonal proliferation in response to their specific antigens, where as reduction in numbers of some cells might result from their antigen-specific apoptosis or selective removal from the peripheral circulation.

CD4 T cells have receptors that recognize the mycobacterial antigens linked with MHC II antigens, which are present on antigen-presenting cells such as macrophages. In contrast, CD8 T cells react with all nucleated cells with MHC I antigen-associated mycobacterial antigens. As these surface markers are involved in antigen recognition, their levels indicate immune reactivity.

The profiles of immune cells have been found to be altered in people over the age of seventy years<sup>1</sup>, therefore all the subjects chosen for this study were below this age. It has been well established that the levels of immune cells change and particularly the level of CD4 declines following HIV infections<sup>2</sup>. Therefore, HIV-ve patients with pulmonary tuberculosis were investigated to observe the effect of *M. tuberculosis* on the host immune cells. In HIV infected people, it is known that CD4 T cells are attacked and lysed. With, *M. tuberculosis*, it is also known that they reside in

#### *Correspondence to:*

Dr. Navin Thapa  
Department of Microbiology and Immunology  
Kathmandu University Medical School  
PO Box 21833  
Kathmandu, Nepal  
Tel: 0977-11-664407  
Email: kums@wlink.com.np

macrophages but it is not certain which types of lymphocytes they specifically attack.

Previous studies have reported alterations in the proportions of lymphocytes as well as their absolute counts<sup>1,3</sup>. They have also mentioned that the absolute numbers of lymphocytes is reduced<sup>1</sup>. Although, a cytometer could have been used in addition to the FACS to measure the actual number of different types of T cells, this was not done and only the proportions of cells were calculated. The proportions of cells were sought to study the interactions between these immune cells.

### Materials And Methods

1-2 ml of blood was obtained by venepuncture and lithium-heparinated. This blood was spun at 3000 rpm for 5 minutes, and the plasma was removed using a Pasteur pipette. Next, the blood cells were washed in 4-8 ml of heparinated washing buffer (PBS/1%BSA/0.1%sodium azide+10U/ml heparin). The blood cells were suspended in 1-2 ml of washing buffer.

### Staining

50 µl of whole blood was put in each LP3 tube for a single test. Controls included cells without any monoclonal antibodies (Mabs) for instrumentation settings, particularly FSC and SSC. Single Mabs were used for compensation. Appropriate isotype controls were also used. Next, 5 µl of anti-CD4 Mab labelled with fluorescein isothiocyanate (FITC), anti-CD8 Mab labelled with phycoerythrin (PE) and anti-CD3 Mab labelled with Cychrome (Cg5) were added in the tube, and incubated at 4°C for 30 minutes. 2 ml of lysis buffer (Becton Dickinson) diluted (1in 10) in distilled water was put in each tube and incubated at room temperature in the dark for 10 minutes. Next, the tubes were spun at 3000 rpm for 5 minutes. The supernatant was sucked off and the pelleted cells were washed in washing buffer. Finally, the stained cells were suspended in 500 µl of 0.2% paraformaldehyde solution.

### Scatter Detector And Amplifier

Channels	Lin/log	Detector	Amplifier
FSC	LIN	E00	1.5
SSC	LIN	420	2.1
FL1	LOG	550	----
FL2	LOG	550	----
FL3	LOG	550	----

### Compensation

Channels	CD4-CD8-CD3
FL1-FL2(%)	1.0
FL2-FL1(%)	32
FL2-FL3(%)	1.0
FL3-FL2(%)	20

### Running The Cell Sample

The threshold was set with the forward scatter at 100. The lymphocyte cell populations were gated and information for 10,000 cell events were stored

### Data Analyses

The data files were read using Hewlett Packard reader software. Dot-plots and histograms were plotted for three parameters and the % of cells with different cell surface markers (CSMs) were calculated.

### Results

Table 1: The percentages of CD3 T cells, which were CD4, or CD8 T cells in TB patients and healthy controls.

Percentages of cells (%)	Healthy (n=20)	TB (n=20)	Statistical significance
CD4/CD3 T cells	55+/-9	52+/-10	Not significant
CD8/CD3 T cells	30+/-6	38+/-10	P<0.007

When the proportions of CD4 and CD8 T cells are calculated out of CD3 T cells, the proportion of CD8 T cells is found to be significantly increased (p<0.007, Mann-Whitney test). The proportion of

---

double negative cells was found to be unchanged and has not been shown.

## Discussion & Conclusions

Some investigators have shown that the total numbers of lymphocytes including the T cells are reduced in tuberculosis<sup>1</sup>. This suggests that both cell-mediated immunity is lowered in tuberculosis. The present study shows that the proportion of T cells was reduced compared to their healthy counterparts. This might mean that the cell-mediated immunity might be selectively depressed in pulmonary tuberculosis. Some previous studies have shown decreased CD4:CD8 T cell ratio in the peripheral blood of patients with tuberculosis, where as others have shown that there was no change<sup>1,4</sup>. As the present study did not count the absolute numbers of T cells, it is not known if the number of CD4 T cells is reduced or the number of CD8 T cells is increased. Previous studies suggest that these numbers are reduced.

The proportions of immune cells were also found to be linked with the degree of severity of lesions so that patients with more severe lesions had lower proportions of lymphocytes compared to peripheral leukocytes<sup>1</sup>. This might mean that these immune cells leave the peripheral circulation and enter the lesions to combat against the mycobacteria present there.

It is not known if CD4 T cells are reduced before the onset of pulmonary tuberculosis or this occurs after the onset of the disease. It has to be found out whether the changes in the proportions of immune cells occur prior to pulmonary tuberculosis or after the disease develops. The changes in the expression of some cell surface markers might be caused by primary immune dysfunction or they might follow the exposure to mycobacterial antigens. The reduction in the level of CD4 T cells has been associated with increased susceptibility to opportunistic infections including mycobacterioses, as in HIV+ve patients<sup>5</sup>. This might also occur in tuberculosis patients without HIV infections. Previous investigators have found that differences in BCG vaccination or tuberculin

skin-test reactivities bear no relations to the proportions of different immune cells<sup>10</sup>. Some investigators have reported that the decrease in the level of CD4 T cells seen in pulmonary tuberculosis resolves after chemotherapy for 6 months<sup>6,7,8</sup>, which suggests that the disease might cause the change in the level of CD4 than vice versa.

It is not known if all stem cells can acquire the particular marker if they are exposed to certain conditions or if only certain stem cells are predestined to express a particular marker. The factors which control the stem cell replication are also likely to determine the eventual composition of cells. The factors which govern the survival of the immune cells might also be important. In general, an increase in the expression of cell types with a particular marker could arise as a result of its increased synthesis and release into the circulation. Their decrease could occur following their apoptosis<sup>11</sup>.

It may also be possible for the CD4 and CD3 T cells to migrate out of the peripheral circulation into the lesions. For example, a higher proportion of CD3+ CD4+ T lymphocytes, with a relatively lower proportion of CD3+CD8+ T lymphocytes, was detected for the patients with a higher grade of pulmonary TB, compared to patients with a lower grade of pulmonary TB, resulting in an increased broncho-alveolar fluid (BALF) C4+/CD8+ ratio, opposite of the situation seen in the peripheral blood<sup>12</sup>.

Increased levels of immune cells are found also in cases of irritants presented to the lungs such as in the smokers, who not only show increased levels of immune cells in their BALF but also increased level of CD8 T cells and decreased CD4:CD8 T cells ratio in their BALF<sup>13</sup>. In addition, patients with tubercular pleural effusions also showed higher levels of CD4:CD8 T cells ratio in the pleural effusions compared to their peripheral blood<sup>14,15</sup>. They also have higher levels of HLADR+ve CD3 T cells in the pleural fluid than in their peripheral blood<sup>15</sup>. The selective increase and CD4 T cells compared to CD8 T cells are also present in sarcoidosis<sup>16</sup>. However, this is not present in BALF

---

of all types of immune or lung disorders and that the opposite may be seen in some instances such as idiopathic pulmonary fibrosis <sup>16</sup>.

The reasons for the reductions in the proportions of CD4 and CD3 might not be some mechanism specific to mycobacterioses but might be non-specific due to secondary effects of the infection. For example, the proportions of CD4 and CD3 are not only reduced in mycobacterioses but are also found in other chronic infections such as hookworm disease studied in Nigeria <sup>17</sup>. The reduction in the level of CD4 T cells is also seen in patients with cancers <sup>18</sup>

The proportion of CD4-CD8- T cells was not changed in pulmonary tuberculosis compared to the healthy controls in this study. The gamma-delta T cells are likely to make substantial proportions of these double negative T cells. Even the peripheral blood <sup>19</sup> and BALF of TB patients have shown no changes in the levels of CD3+ gamma/delta T-lymphocytes compared to healthy controls<sup>20</sup>. However, the CD3+ lymphocytes and CD3+ gamma/delta T-lymphocytes were significantly higher in the BALF, but not in the blood, of patients with TB. There is some evidence from animal models that gamma-delta T cells are the first line of defense against mycobacteria as they appear to compose 26% of T cells in the peritoneal exudate in the first week after injection of *M.bovis*, *BCG* to the mice whereas their relative proportions gradually decrease to 18% by the third week <sup>21</sup>. However, in humans there are reports of increased levels of gamma-delta T cells <sup>22</sup> as well as no change in the levels of gamma-delta T cells in the BALF of patients with pulmonary tuberculosis <sup>23</sup>. The latter concluded that the gamma-delta T cells do not play important roles in humans compared to animal models. Even if the levels of immune cells are unchanged, their activities being altered cannot be ruled out.

Some lymphocytes with unusual phenotypes such as CD4+CD8+ T cells have been detected in the peripheral blood of occasional TB patient<sup>24</sup>, a healthy person<sup>25</sup> as well as patients with various other disorders<sup>26</sup>. The significance of these double-positive cells to the pathology of pulmonary

tuberculosis is not clear. As these T cells are normally present in the thymus and undergo maturation to develop into single-positive (CD4+CD8- or CD4-CD8+) T cells, it is likely that immature double-positive (CD4+CD8+)T cells are released into the circulation owing to high demand or adaptations required for various immune responses.

The subjects included in this study included indigenous Caucasians as well as immigrants in the United Kingdom. Some researchers have shown that different racial groups can have differences in the levels of their immune cells including their CD4 and CD8 T cells <sup>27</sup>. Therefore, it would be fruitful to carryout this investigation including Nepalese patients with pulmonary tuberculosis and healthy Nepalese controls.

## References

1. Wada, M. Flow cytometric analysis of peripheral T lymphocytes from patients with mycobacterial diseases. *Kekkaku*. 1992 May;67(5):393-407.
2. Bofill M, Janossy G, Lee CA, MacDonald-Burns D, Phillips AN, Sabin C, Timms A, Johnson MA, Kernoff PB. Laboratory control values for CD4 and CD8 T lymphocytes. Implications for HIV-1 diagnosis. *Clin Exp Immunol*. 1992 May;88(2):243-52.
3. Bonecini-Almeida MG. Flow cytometry as a tool to identify Mycobacterium tuberculosis interaction with the immune system and drug susceptibility. *Mem Inst Oswaldo Cruz*. 2000 Jul-Aug;95(4):491-4.
4. Hoheisel GB, Tabak L, Teschler H, Erkan F, Kroegel C, Costabel U. Bronchoalveolar lavage cytology and immunocytology in pulmonary tuberculosis. *Am J Respir Crit Care Med*. 1994 Feb;149(2 Pt 1):460-3.
5. Yamamoto S, Wada M, Toida I. Studies on the significance of CD4+ T lymphocytes in the development of tuberculosis. *Kekkaku*. 1993 Jan;68(1):13-21.
6. Rodrigues DS, Medeiros EA, Weckx LY, Bonnez W, Salomao R, Kallas EG. Immunophenotypic characterization of peripheral T lymphocytes in Mycobacterium tuberculosis infection and disease. *Clin Exp Immunol*. 2002 Apr;128(1):149-54.
7. Swaminathan S, Nandini KS, Hanna LE, Somu N, Narayanan PR, Barnes PF. T-lymphocyte

- subpopulations in tuberculosis. *Indian Pediatr.* 2000 May;37(5):489-95.
8. Singhal M, Banavalikar JN, Sharma S, Saha K. Peripheral blood T lymphocyte subpopulations in patients with tuberculosis and the effect of chemotherapy. *Tubercle.* 1989 Sep;70(3):171-8.
  9. Singhal M, Banavalikar JN, Sharma S, Saha K. Peripheral blood T lymphocyte subpopulations in patients with tuberculosis and the effect of chemotherapy. *Tubercle.* 1989 Sep;70(3):171-8.
  10. Madhi SA, Gray GE, Huebner RE, Sherman G, McKinnon D, Pettifor JM. Correlation between CD4+ lymphocyte counts, concurrent antigen skin test and tuberculin skin test reactivity in human immunodeficiency virus type 1-infected and -uninfected children with tuberculosis. *Pediatr Infect Dis J.* 1999 Sep;18(9):800-5.
  11. Chernykh ER, Sakhno LV, Khonina MA, Tikhonova MA, Kozhevnikov VS, Nikonov SD, Zhdanov OA, Ostanin AA. T cell subsets undergoing apoptosis and anergy in patients with pulmonary tuberculosis. *Probl Tuberk.* 2002;(7):43-8.
  12. Tsao TC, Chen CH, Hong JH, Hsieh MJ, Tsao KC, Lee CH. Shifts of T4/T8 T lymphocytes from BAL fluid and peripheral blood by clinical grade in patients with pulmonary tuberculosis. *Chest.* 2002 Oct;122(4):1285-91.
  13. Hoser G, Kawiak J, Domagala-Kulawik J, Kopinski P, Droszcz W. Flow cytometric evaluation of lymphocyte subpopulations in BALF of healthy smokers and nonsmokers. *Folia Histochem Cytobiol.* 1999;37(1):25-30.
  14. Guzman J, Bross KJ, Wurtemberger G, Freudenberg N, Costabel U. Tuberculous pleural effusions: lymphocyte phenotypes in comparison with other lymphocyte-rich effusions. *Diagn Cytopathol.* 1989;5(2):139-44.
  15. San Jose ME, Valdes L, Saavedra MJ, De Vega JM, Alvarez D, Vinuela J, Penela P, Valle JM, Seoane R. Lymphocyte populations in tuberculous pleural effusions. *Ann Clin Biochem.* 1999 Jul;36 (Pt 4):492-500.
  16. Ma W, Cui W., Lin Q. Improved immunophenotyping of lymphocytes in bronchoalveolar lavage fluid (BALF) by flow cytometry. *Clin Chim Acta.* 2001 Nov;313(1-2):133-8.
  17. Onyemelukwe GC, Musa BO. T-lymphocyte subsets in patients with hookworm infection in Zaria, Nigeria. *Afr J Med Sci.* 2001 Dec;30(4):255-9.
  18. Sevcikova L, Hunakova L, Chorvath B, Turzova M, Boljesikova E. T-lymphocyte subsets (CD4/CD8 ratio) in breast cancer patients. *Neoplasma.* 1992;39(4):219-22.
  19. Shijubo N, Nakanishi F, Hirasawa M, Sighara K, Sasaki H, Asakawa M, Suzuki A. Phenotypic analysis in peripheral blood lymphocytes of patients with pulmonary tuberculosis. *Kekkaku.* 1992 Sep;67(9):581-5.
  20. Tsao TC, Tsao KC, Lin MC, Huang CC, Yang CT, Liao SK, Chang KS. Increased absolute number but not proportion of gamma/delta T-lymphocytes in the bronchoalveolar lavage fluid of patients with active pulmonary tuberculosis. *Tuber Lung Dis.* 1999;79(4):215-20.
  21. Inoue T, Yoshikai Y, Matsuzaki G, Nomoto K. Early appearing gamma/delta-bearing T cells during infection with Calmette Guerin bacillus. *J Immunol.* 1991 Apr 15;146(8):2754-62.
  22. Balbi B, Valle MT, Oddera S, Giunti D, Manca F, Rossi GA, Allegra L. T-lymphocytes with gamma delta+ V delta 2+ antigen receptors are present in increased proportions in a fraction of patients with tuberculosis or with sarcoidosis. *Am Rev Respir Dis.* 1993 Dec;148(6 Pt 1):1685-90.
  23. Uh ST, Ki SY, Lim GI, Moon SH, Jeong SW, Kim HT, Kim YH, Park CS. The T cell receptor subsets of lymphocytes in bronchoalveolar lavage in patients with active pulmonary tuberculosis. *Respir Med.* 1998 Mar;92(3):408-14.
  24. Ohnishi, K. Expansion of CD4+CD8+ T lymphocytes in the peripheral blood of a patient with pulmonary tuberculosis. *Rinsho Byori.* 1992 Sep;40(9):959-64.
  25. Kay NE, Bone N, Hupke M, Dalmaso AP. Expansion of a lymphocyte population co-expressing T4 (CD4) and T8 (CD8) antigens in the peripheral blood of a normal adult male. *Blood.* 1990 May 15;75(10):2024-9.
  26. Ortolani C, Forti E, Radin E, Cibin R, Cossarizza A. Cytofluorimetric identification of two populations of double positive (CD4+, CD8+) T lymphocytes in human peripheral blood. *Biochem Biophys Res Commun.* 1993 Mar 15;191(2):601-9.
  27. Shahabuddin S. Quantitative differences in CD8+ lymphocytes, CD4/CD8 ratio, NK cells, and HLA-DR(+)-activated T cells of racially different male populations. *Clin Immunol Immunopathol.* 1995 May;75(2):168-70.



## Socio-demographic characteristics of families with and without TB suspects: findings from a community based survey in Kathmandu valley

M M Rahman,<sup>1</sup> K K Jha,<sup>2</sup> R M Piryani,<sup>3</sup> B P Rijal<sup>4</sup>

<sup>1</sup> Epidemiologist, <sup>2</sup> Director <sup>3</sup> Deputy Director <sup>4</sup> Ex Microbiologist, SAARC TB centre

### Abstract

Setting: Bhaktapur and Kathmandu Districts in Kathmandu Valley.

Objectives: To identify TB suspect in the community and to compare socio-demographic characteristics of families with and without TB suspects.

Methods: Data were collected during July and August 2004 through house-to-house survey by using pre-tested questionnaires. A total of 3830 households (HH) were surveyed covering 18947 populations of all ages and both sexes.

Results: Overall prevalence of TS was 7.5/1000 population; prevalence was significantly higher in Bhaktapur than that in Kathmandu (9.1/1000 Vs 5.9/1000 population;  $p < .05$ ). No significant sex difference in prevalence was found in relation to area (Rural- Urban) or age groups. Compared to Kathmandu significantly lower number of pucca houses ( $p < .001$ ), lower literacy rate and lower income were found in Bhaktapur. Average duration of cough was higher ( $290 \pm 488$  days) in Bhaktapur than Kathmandu ( $162 \pm 250$  days) ( $p = .043$ ). No significant sex difference was found in duration of cough. Socio-economic condition and educational status of the families with TB suspects were comparatively lower than that of families without TB suspects.

Conclusions: More or less equal number of males and females has respiratory symptoms related to TB in the surveyed community, where people belonging to lower socioeconomic conditions are at higher risk of developing respiratory symptoms.

*Key Words:* TB suspect, Socio-demographic condition, Kathmandu Valley

### Introduction

Tuberculosis causes an enormous burden of morbidity and mortality around the world. TB is also a major public health problem of the SAARC region that bears a disproportionately higher burden of the disease.<sup>1-6</sup>

National Tuberculosis Programmes in this region has been operational since the early 1960's but has not been effective in terms of case detection or treatment outcome. Consequently DOTS strategy (new strategy for TB control recommended by WHO) was initiated in 1993 and by 1996 all the SAARC member countries adopted this strategy and by end of 2002 covered nearly 60% of the total population. Treatment outcome was found satisfactory, with a success rate of 85% (regionally) but case detection was low (44% regionally)<sup>6</sup>.

#### *Correspondence to*

SAARC Tuberculosis Centre  
Thimi, Bhaktapur,  
GPO Box No. 9517, Kathmandu, Nepal  
Tel: 00977-1-6631048, 6632601, 6632477  
Fax: 00977-1-6634379  
E-mail: saarctb@mos.com.np  
Website: www.saarctb.com.np

Reports of TB cases suggest, virtually in all countries, fewer female than male TB cases are notified<sup>7</sup>. Community based epidemiological studies have established that males have a higher prevalence of TB infection and a higher rate of progression from infection to active disease than females<sup>7,8</sup>. Yet there are concerns that females suffering from TB are underreported due to various socio-cultural factors e.g. reduced access to health care services, under-reporting of respiratory morbidity and greater stigmatization<sup>7</sup>.

Moreover profound gender differentials existing in SAARC member countries may create barriers for women in seeking health care leading to under reporting of female TB cases in this region<sup>9</sup>.

Keeping these back ground in mind SAARC TB centre (STC) conducted a study in Kathmandu valley to identify TB suspects in the community level and then to assess their care seeking behaviour and Barriers in seeking health care with gender differences. The aim of this paper is to compare the socio-demographic characteristics of families with and without TB suspects.

## Methodology

Type /design of study: this was a community-based cross sectional study.

### Study place, population and sample size:

Two Village Development Committees (VDC) under Bhaktapur district and 2 municipality wards under Kathmandu district in Nepal were selected (in non-random basis) for this study.

A total of 18947 inhabitants of all ages and both sexes were covered from 3830 households.

Study tools, data collection technique and period of data collection: Semi -structured pre-tested questionnaires were used for collection of data about households and TB suspects. In the questionnaires both English and Nepali languages were used. Eight interviewers (4 males & 4 females) and one supervisor were recruited for data collection and supervision respectively. The interviewers and supervisor were oriented theoretically and practically on household identification and data collection. A survey guide was also provided for ready reference.

In each district 4 interviewers were deployed; they were divided into 2 groups each comprising of one male and one female interviewer. At household level house hold head or when necessary his/her alternatives was interviewed on socio-demographic variables and TB suspect. Data collection was done in the month of July and August of 2004.

For quality assurance data collection was supervised by the recruited supervisor as well as STC officials.

## Data entry and analysis

A database was prepared in SPSS 2003 soft ware programme to enter and analyze the data. After entering, the data were checked and cleaned before analysis that was done on the basis of the objectives. The level of statistical significance was defined as  $p \leq 0.05$ .

## Results

### Population surveyed and TS identified

A total of 18947 population of all ages and both sexes were surveyed from 3830 households. In total, 143 (7.5/1000 population) TB suspects were identified; among them 87 (9.1/1000 population) were from Bhaktapur and 56 (5.9/1000 population) were from Kathmandu district. The prevalence of TB suspect was significantly higher in Bhaktapur compared to Kathmandu ( $p < .05$ ), (Table 1).

Table 1: Population surveyed and TS identified

Area	No. of HH	No. of population	TS Identified (Per 1000 population)
Dadhikot	810	4248	18 (4.2)
Katunje	990	5277	69 (13.1)
<b>Subtotal (Bhaktapur )</b>	<b>1800</b>	<b>9525</b>	<b>87 (9.1)</b>
Ward 18	1518	6995	45 (6.4)
Ward 28	512	2427	11 (4.5)
<b>Subtotal (Kathmandu )</b>	<b>2030</b>	<b>9422</b>	<b>56 (5.9)</b>
<b>Total</b>	<b>3830</b>	<b>18947</b>	<b>143 (7.5)</b>

### Socio-demographic Characteristics of the Surveyed Households

- Type of House (Table 2a)  
Numbers of kacha and semi pucca houses are significantly higher in Bhaktapur than those in Kathmandu, ( $p < .001$ ).
- Sex, Occupation and Education of the Household heads (Table 2a)  
Sex: The proportion of female household heads in Kathmandu was significantly higher than that in Bhaktapur (15.7% Vs 11.8 %,  $p < .001$ ).

Occupation: In Bhaktapur the main occupations of the household heads were farming (31.1%) and service (27.3%) followed by business (15.8%). Whereas in Kathmandu business was the most common occupation (35.8%) followed by service (18.2%); only (4.5%) of the household heads was farmer.

Education: Bhaktapur had higher number of non educated household head than Kathmandu (23% Vs 17%,  $p < .001$ ).

Table 2a. Type of house, and sex, occupation & educational level of household heads

Variables		Bhaktapur n (%)	Kathmandu n (%)	Total n (%)
Type of house	Kancha	73 (4.1)	30 (1.5)	103 (2.7)
	Semi-pucca	807 (44.8)	794 (39.1)	1601 (41.8)
	Pucca	920 (51.1)	1206 (59.4)	2116 (55.5)
	Total	1800 (100)	2030 (100)	3830 (100)
Sex of households	Male	1588 (88.2)	1711 (84.3)	3299 (86.1)
	Female	212 (11.8)	319 (15.7)	531 (13.9)
	Total	1800 (100)	2030 (100)	3830 (100)
Occupation of household heads	Farming	564 (31.3)	91 (4.5)	655 (17.1)
	Service except driving	531 (29.5)	412 (20.3)	943 (24.6)
	Business	285 (15.8)	727 (35.8)	1012 (26.4)
	Day labourer	104 (5.8)	123 (6.1)	227 (5.9)
	Industry/ Garments worker	92 (5.1)	110 (5.4)	202 (5.3)
	Driving	39 (2.2)	69 (3.4)	108 (2.8)
	Housewife	102 (5.7)	208 (10.2)	310 (8.1)
	Others	83 (4.6)	290 (14.3)	373 (9.7)
	Total	1800 (100)	2030 (100)	3830 (100)
Educational level of household heads	Non- educated	410 (22.8)	350 (17.2)	760 (19.9)
	Class I-IV	328 (18.2)	408 (20.1)	736 (19.2)
	Class V to VII	247 (13.7)	267 (13.2)	514 (13.4)
	Class VIII-X (Not SLC passed)	306 (17.0)	306 (15.1)	612 (16.0)
	SLC passed	279 (15.5)	302 (14.9)	581 (15.2)
	12 class passed	116 (6.4)	181 (8.9)	297 (7.8)
	Graduate & above	112 (6.3)	215 (10.6)	327 (8.5)
	Total	1798 (100)	2029 (100)	3827 (100)

- Age of the household heads, number of bedroom, income, family size and family member per bed room

In the table No. 2b average values of the above variables are shown. Mean age of the household heads and mean household size were significantly higher in Bhaktapur than

Kathmandu. Where as mean income and mean number of family member per bedroom were higher significantly in Kathmandu than Bhaktapur ( $p < .001$ ).

Table 2b. Mean values of Household heads' age, number of bedroom, income, family size and family member per bedroom

Variable	Area	Mean $\pm$ Sd	Median	Mode	Range	$p$ value	
Age of HH head in completed years	Bhaktapur	45.07 $\pm$ 14.4	42	40	16-100	<.023	
	Kathmandu	43.96 $\pm$ 16.1	42	40	14-93		
Number of bedroom	Bhaktapur	2.58 $\pm$ 1.26	2	2	1-9	<.001	
	Kathmandu	2.12 $\pm$ 1.32	2	1	1-9		
Monthly income of the family NRs	Bhaktapur	5518 $\pm$ 4231	5000	5000	100-73000	<.001	
	Kathmandu	8082.5 $\pm$ 601	6000	10000	500-60000		
Number of family members	Male	Bhaktapur	2.67 $\pm$ 1.30	2	2	0-10	<.001
		Kathmandu	2.49 $\pm$ 1.45	2	2	0-11	
	Female	Bhaktapur	2.62 $\pm$ 1.45	2	2	0-14	
		Kathmandu	2.16 $\pm$ 1.60	2	2	0-13	
	Total	Bhaktapur	5.29 $\pm$ 2.226	5	4	1-22	
		Kathmandu	4.64 $\pm$ 2.437	4	4	1-20	
Average No. of family member per bedroom	Bhaktapur	2.29 $\pm$ 0.947	2	2	0.5-10	<.001	
	Kathmandu	2.58 $\pm$ 1.304	2	2	0.33-12		

- Age and sex distribution of the surveyed population is shown in Table 3. In both the areas there is no significant sex difference among the age groups. But in Kathmandu total number of males is significantly higher than that of females in comparison to Bhaktapur (115/100 female Vs 101/100 female;  $p < .001$ ).

Table 3. Age & Sex of the surveyed Population

Age group	Bhaktapur			Kathmandu		
	Male (%)	Female (%)	Total (%)	Male (%)	Female (%)	Total (%)
<15	1407 (52)	1299 (48)	2706 (28)	1161 (53)	1025 (47)	2186 (23.2)
15-49	2780 (49)	2842 (51)	5622 (59)	3228(54.2)	2730 (45.8)	5958(63.2)
50+	621(52)	576 (48)	1197 (13)	656 (51.3)	622 (48.7)	1278 (13.6)
Total	4808 (50.5)	4717 (49.5)	9525(100)	5045 (53.6)	4377 (46.4)	9422 (100)

Table 4. Age & Sex of the identified TB suspects

Age group	Bhaktapur			Kathmandu		
	Male (%)	Female (%)	Total (%)	Male (%)	Female (%)	Total (%)
<15	1 (25)	3 (75)	4 (4.6)	2 (33.3)	4 (66.7)	6 (10.7)
15-49	15 (37.5)	25 (62.5)	40 (46)	18 (52.9)	16 (47.1)	34 (60.7)
50+	19 (44.2)	24 (55.8)	43 (49.4)	7 (43.8)	9 (56.3)	16 (28.6)
Total	35 (40)	52 (60)	87 (100)	27 (48.2)	29 (51.8)	56 (100)

---

## Information about the identified TB suspects

- Prevalence of TB suspect

Prevalence of TB was significantly higher in Bhaktapur than Kathmandu (9.1 Vs 5.9 per 1000 population ( $p < .05$ ), (Table 1).

- Age and sex of the TB suspect:

Though more females were identified as TB suspect (especially in Bhaktapur), no significant sex difference of TB suspect was found between the two areas. Also no significant sex difference was found between the surveyed population and identified TB suspects in either of the area (Table 4). Average age of the TB suspect was significantly higher ( $45.57 \pm 18.7$ ) in Bhaktapur than that in Kathmandu ( $35.64 \pm 17.7$ ) ( $p < .01$ ). But no significant sex difference was found in average age of the TB suspect ( $p = 0.375$ ).

- Occupation of the TB suspect

Nearly 1/3<sup>rd</sup> (32.2%) of the total TB suspects was farmer and the TB suspect belonging to this occupation was significantly higher in Bhaktapur than that in Kathmandu (48.3% Vs 7.1%;  $p < .001$ )

- Education of the TB suspect

Near about 57% of the total TB suspects had no education and the number of non-educated TB suspect was significantly higher in Bhaktapur than that in Kathmandu (66.7% Vs 41.1%;  $p < .01$ ).

- Symptoms of the TB suspect

Out of 143 identified TB suspect 141 (98.6%) had cough for 2 weeks or more; one of the remaining 2 had swollen neck gland and one had back pain with fever of long duration (those 2 were considered as extra-pulmonary TB suspects).

The next commonest symptom was chest pain (87%), followed by fever (82%). Other symptoms were loss of appetite (64%), loss of weight (43%) and blood in sputum (16%).

Comparison of duration of symptoms between areas reveals that there was significant difference only in mean duration of cough between Bhaktapur (290 days) and Kathmandu (162 days) ( $p < .05$ ). In sex wise comparison only loss of weight shows significantly higher mean duration among females than that among males (178 days Vs 69 days; ( $p < .01$ ).

## Comparison of families with and without TB suspect by some socio-demographic characteristics

Larger family size (5.34 Vs 4.93) and higher number of person per bedroom (2.68 Vs 2.44) were found in families with TB suspect compared to families without TB suspect, though these differences were not statistically significant. Average monthly income of the families with TB suspect was significantly lower than that of families without TB suspect (5134 Vs 6944 NRs;  $p < .001$ ) (Table No. 5)

In families with TB suspect significantly higher proportion of kacha (9.6 Vs 2.4%) and semipucca (50.4 Vs 41.5) houses were found in comparison to families without TB suspect ( $p < .001$ ). It was also found that significantly larger proportion (34.8 Vs 16.5%) of household heads belonging to the families with TB suspect were engaged in farming occupation in comparison to families without TB suspect ( $p < .001$ ). Significantly higher number of non educated households were found among families with TB suspect in comparison to families without TB suspect (38.5 % Vs 19.2 %,  $p < .001$ ), (Table 6).

Table 5: Comparison of average values of family size, bedroom and income between families with and without TB suspect

Variable	Families	Mean	Standard Deviation	<i>p</i> value
Family size	With TB suspect	5.34	2.62	0.077
	Without TB suspect	4.93	2.35	
Number of bedroom	With TB suspect	2.29	1.296	0.713
	Without TB suspect	2.34	1.312	
No. of family member per bedroom	With TB suspect	2.68	1.53	0.071
	Without TB suspect	2.44	1.14	
Monthly income NRs	With TB suspect	5133	3714	<0.001
	Without TB suspect	6944	5446	

Table 6: Comparison between families with and without TB suspect by type of house and occupation & education of Household heads

Variable		Families			<i>P</i> value
		With TS	Without TS	Total	
		Freq (%)	Freq (%)		
Type of house	Kacha	13 (9.6)	90 (2.4)	103	<0.001
	Semipucca	68 (50.4)	1533 (41.5)	1601	
	Pucca	54 (40)	2072 (56.1)	2126	
	Total	135	3695	3830	
Occupation of the Household head	Farming	47 (34.8)	608 (16.5)	655	<0.001
	Other than farming	88 (65.2)	3087 (83.5)	3175	
	Total	135	3695	3830	
Education of the Household head	Non educated	52 (38.5)	708 (19.2)	760	<0.001
	Educated	83 (61.5)	2987 (80.8)	3070	
	Total	135	3695	3830	

## Discussion and conclusion

This is the first community-based survey conducted by SAARC TB centre. The study was conducted in 2 VDCs of Bhaktapur district and 2 Municipality wards under Kathmandu district where TB control services through DOTS strategy are going on.

Prevalence of TB suspect was significantly higher in Bhaktapur (rural set up) compared to Kathmandu (urban set up) (9.1 Vs 5.9 per 1000 population;  $p < .05$ ). Significantly higher number of kacha and semipucca houses ( $p < .001$ ), higher proportion of farmer household heads ( $p < .001$ ) and lower literacy rate ( $p < .001$ ) in Bhaktapur reflect rural characteristics that might be the possible cause of higher prevalence of TB suspect.

Comparison of socioeconomic factors between families having TB suspect and families without TB

suspect reveals significantly lower income ( $p < .001$ ), more kacha and semipucca houses ( $p < .001$ ) and lower literacy rate ( $p < .001$ ) of household heads among families having TB suspect. These are all in favour of the fact that TB is linked with poverty and illiteracy. Larger average family size (though not statistically significant) was also observed among the families having TB suspect.

Significantly higher average age of the TB suspect and longer durations of all the symptoms in Bhaktapur might be due to ignorance and low level of knowledge or awareness of the people.

No significant difference in average age was found between two sexes of the TB suspects though it

---

was slightly higher in case of male. Larger sample of TB suspect may give conclusive opinion.

Longer average duration of symptoms (though not significant except loss of weight) among the female TB suspect might be due to negligence, ignorance or fear of being stigmatized; larger sample may give conclusive opinion.

### Limitation

The findings reflect the study area only and the number of TB suspect is not sufficient to come to broad based conclusions.

### Acknowledgement

The authors would like to thank the local administrative officials and population of the study area for their cooperation during data collection.

### References

1. Treatment of Tuberculosis: Guidelines for national programmes, 3<sup>rd</sup> edition, WHO, Geneva 2003, p11.
2. Upleker M, Rangan S, Ogden J.1998. Gender and Tuberculosis Control: Towards a strategy for Research and Action. WHO, Geneva, Switzerland.
3. WHO report 2004, Global TB control, Surveillance, planning, financing; communicable diseases, WHO, Geneva
4. World Health Organization, Fight AIDS, fight TB, fight now information pack, 2004, distributed in Stop TB Partners' Forum, New Delhi, 25 March 2004
5. Lisa M. Butler, Ana Maria Xet Mull. 2001. A community-Based Approach to Understanding Factors Influencing TB Control and Prevention in Contra Costa Country, California. Human Right Center Summer Fellowship, Final Report.
6. SAARC TB centre, 2004. Tuberculosis in the SAARC Region, an update 2004. STC, Bhaktapur, Nepal, 2004 (draft report).
7. R. Balasubramanian et al. gender disparities in tuberculosis: report from a rural DOTS Programme in South India, Int. J TUBERC LUNG DISE .2004; 8(3): 323-332.
8. Reider H L. epidemiologic Basis of Tuberculosis. Paris, France: IUATLD, 1999.
9. SAARC TB centre, January 2004. Gender difference among Tuberculosis patients in National TB Control Programmes within SAARC Countries, STC, Bhaktapur, Nepal

## Smoking Habits among School Teachers of Taluka Nagarparkar, Sindh, Pakistan

Rano Mal Piryani, Meva Ram, Setal Das, Guatam

*Taluka Hospital, Nagarparkar, Sindh, Pakistan*

### Abstract

**Background** - It is fact that most of the people acquire the habit of smoking in their teens. The teenagers are the targets of transnational tobacco companies. This is the age when children enter into secondary schools. Students have to spend nearly one fourth of their time in school and remain closely attached with the teachers. Schoolteachers serve not only as a significant influence on acquisition of student's knowledge, attitudes and behaviors but also act as continuous role model for the students.

**Objectives** - 1. To know the prevalence of smoking among secondary school teachers of Taluka Nagarparkar. 2. To assess the money spent on smoking by schoolteachers 3. To know whether school curriculum contain lessons on anti tobacco smoking or not. 4. To know whether schoolteachers are imparting health education on tobacco smoking or not.

**Methods** - This is questionnaire-based survey done in secondary schools of taluka Nagarparkar District Tharparkar, Sindh Pakistan in year 2002. Questionnaire were distributed among all teachers of all middle and high schools of taluka through messengers and collected by the same source. Data was entered into SPSS 11.0 version and analysed.

**Results** - Response rate was 81.0 %. All were male Average age of teachers was  $34.6 \pm 6.8$  years, length of service  $12.3 \pm 4.8$  years and salary  $6575 \pm 2010$  Pak rupees per month. Prevalence of smoking was 56.7%. Average age at which they acquired smoking habit was  $18 \pm 4$  (10-22); number of cigarettes smoked per day was  $11 \pm 7$ . They were consuming 5.5% of their monthly salary for purchasing cigarettes. None of the teachers was smoking during teaching while 12% was smoking during duty hours and 70% tried to quit smoking.

Eighty two percent of smokers and 69% of non-smokers considered smoking is bad while 76.5 % of smokers and 53.8% of non-smokers was imparting education to students about health hazards of tobacco smoking. School curriculum did not contain lesson on tobacco smoking.

**Conclusion** - Though this study is limited by self-administration of questionnaire and high non-response rate with likely chances of bias; but put light on the issue identified. The data indicates a need for educating teachers about smoking, offering cessation services to teachers, promoting no tobacco policy in schools, inclusion of lesson on tobacco use and its health hazards in school curriculum, imparting health education to students regularly and helping students by resisting pressure from the media, friends and peers to use tobacco.

**Introduction** - Tobacco epidemic has shifted from developed world to developing and under developed countries. Teenagers, in these countries are the targets of transnational tobacco

companies. They are sure that once the teenagers take up the habit of tobacco smoking, they will remain their clients forever or at least for a longer period of time<sup>1</sup>. There is evidence that teenagers may not have the capacity to properly assess any information that they possess about the health hazards of smoking. Pakistan faces the same threat. Here majority of the people acquire the habit of tobacco smoking in teens<sup>2</sup>. This is the age when children enter into secondary schools. Students have to spend

### *Correspondence*

Dr. Rano Mal Piryani

Deputy Director

SAARC TB Centre,

GPO Box No. 9517, Kathmandu.

Tel: 00977-1-6631048, 6632601, 6632477

Fax: 00977-1-6634379

E-mail: dydstc@mos.com.np

E-mail: [r\\_piryani@yahoo.com](mailto:r_piryani@yahoo.com)



nearly one fourth of their time in school and remain closely attached with the teachers. Schoolteachers serve not only as a significant influence on acquisition of student's knowledge, attitudes and behaviors but also act as continuous role model for the students<sup>3</sup>. The risk of incident smoking in children entering secondary education is increased by exposure to other ever smokers in school tutor groups<sup>4</sup>. Teachers play role of guide and they have some influence over their students. They are also legally bound to provide basic health education to their students if school curriculum contains it or morally bound to teach them informally. The prevalence of tobacco smoking among schoolteachers in Urban Delhi was 31 percent<sup>5</sup>. There is dearth of such data in Pakistan. This survey was conducted with the objectives: to know the prevalence of tobacco smoking among secondary school teachers of taluka Nagarparkar, whether school curriculum contain lessons on anti tobacco smoking or not, whether school teachers are imparting health education on tobacco smoking or not and to assess the money spent on smoking by school teachers.

**Methodology-** This is questionnaire-based survey done in secondary schools of taluka Nagarparkar District Tharparkar, Sindh Pakistan in year 2002.

**Setting -** Secondary (Middle and High) Schools of taluka Nagarparkar, district Tharparkar, Sindh, Pakistan.

**Subjects -** School Teachers of Secondary (Middle and High) Schools.

**Sampling -** Serial survey of all secondary school teachers of taluka Nagarparkar.

**Questionnaire -** Questionnaire was prepared and pre-tested at Secondary School Nagarparkar

**Data Collection -** Questionnaires were distributed to all teachers of Secondary (Middle and High) Schools of taluka Nagarparkar through Head Master and team of schoolteachers of Secondary School Nagarparkar. Verbal consent was taken by team of schoolteachers of Secondary School Nagarparkar. They were informed about the purpose of survey. Team of teachers collected questionnaires.

**Data Analysis -** Data was entered into SPSS 11.0 version and analysed.

**Results -** All Five Schools of Taluka Nagarparkar participated in the study. (Govt. High School Nagarparkar, Govt. High School Dano Dhandal, Govt. Middle School Virawah, Govt.

Middle School Sunder and Govt. Middle School Dadvero).

Findings of survey are shown in tables<sup>1-7</sup>.

**Table 1 Response to questionnaire**

No. of questionnaire distributed to school teachers	37
No. of questionnaire received filled from teachers	30
No. of questionnaire received blank from teachers	03
No. of questionnaire not received	04
Response rate	81.8%

**Table 2 Prevalence of smoking**

No. of teachers who filled the questionnaire	30
No. of smoker	17
Prevalence of smoking	56.7%

**Table 3 Descriptive Statistics of all teachers**

Age of School Teachers in years	34.6 ± 6.8 (25-50)
Length of service in years	12.3 ± 4.8 (6-25)
Salary per month in Pak Rupees	6575 ± 2010 (3999-10500)

**Table 4 Descriptive Statistics of smokers**

No. of smokers	17
Age of Smokers in years	34.0 ± 6.2 (28-50)
Length of service in years	11.9 ± 3.7 (7-20)
Salary per month in Pak Rupees	6775 ± 1806 (4196-9000)
Age in years at which smoking started	18 ± 4 (10-25)
No. of cigarettes smoked per day	11 ± 7 (2-20)

**Table 5 Money spent on purchasing cigarettes**

Per day in Pak Rupees	12.50 ± 7.25 (4.00-25.00)
Per month in Pak Rupees	375.00
Percent of salary	5.5 %
Per year in Pak Rupees	4500.00

**Table 6 Descriptive Statistics of smokers**

Variable	Yes		No	
	No.	%	No.	%
Smoking during teaching	0	0.0	17	100
Smoking during duty hours	2	11.8	15	88.2
Student seen to teachers while smoking	2	11.8	15	88.2
Is smoking bad	14	82.3	3	17.7
Tried to quit smoking	12	70.6	5	29.4
Lesson on tobacco smoking in curriculum	0	0.0	17	100
Informal teaching to students about health hazards of tobacco smoking	13	76.5	4	23.5

**Table 7 Descriptive Statistics of Non smokers**

Variable	Yes		No	
	No.	%	No.	%
Is smoking bad	9	69.2	4	30.8
Lesson on tobacco smoking in curriculum	0	0.0	13	100
Informal teaching to students about health hazards of tobacco smoking	7	53.8	6	46.2

**Conclusion and recommendations -**

Though this study is limited by self administration of questionnaire and high non response rate with

---

likely chances of bias; but put light on the issue identified. The study shows high prevalence of tobacco smoking among this group of population i.e. school teachers (56.7%) compared to prevalence in general population (24.5%) in Pakistan<sup>6</sup>. The data indicates a need for educating teachers about smoking, offering cessation services to teachers, promoting no tobacco policy in schools, inclusion of lesson on tobacco use and its health hazards in school curriculum, imparting health education to students regularly and helping students by resisting pressure from the media, friends and peers to use tobacco. It is evident that these strategies help in reducing the prevalence of tobacco among schoolteachers and students in particular and community in general<sup>7, 8, 9, 10</sup>.

**Acknowledgement** - We acknowledge the teachers of secondary schools of taluka Nagarparkar for their participation.

## References

1. Talking to your child about smoking and smokeless tobacco.  
<http://idshealth.org/parents/emotions/behavior/smoking.html>
2. Ehsan Latif. Why tobacco promotion should be banned in Pakistan.  
Pakistan Review (2001)  
[http://www.pakistanreview.com/Health\\_Corner/tobacco\\_pakistan.html](http://www.pakistanreview.com/Health_Corner/tobacco_pakistan.html)
3. Allen KF, Moss AJ, Giovino GA, Shopland DR, Pierce JP. Teenage Tobacco Use: Data Estimates from the Teenage Attitude and Practices Survey: United States, 1989. Advance Data; No. 224. Hyattsville, MD: National Centre for Health Statistics: 1992.
4. Molyneux A, et. ell. Is smoking a communicable disease? Effect of exposure to ever smokers in school tutor groups on the risk of incident smoking in the first year of secondary school. Tobacco Control. 2002 Sep; 11 (3): 241-3
5. Bhattacharjee J, Sharma RS, Verghese T. Tobacco smoking in a defined community of Delhi. Indian J Public health 1994 JAN-mar; 38 (1): 22-6.
6. Alam SE. Prevalence and pattern of smoking in Pakistan. J Pak Med Assoc 1998; 48: 64-6
7. CDC: Adolescents and School Health Program Guidelines. Guidelines for School and Community Programs Prevention Tobacco Use and Addiction, 200.
8. CAS Fact sheet 3, International Study Control of Adolescents Smoking (CAS project). Policy implications and recommendation for a smoke-free school. June 2001
9. Tobacco use among high school students. MMWR Weekly April 03, 1998 / 47 (12): 229-233
10. Carolyn C Johnson. Teachers Smoking History and Attitude Towards a School No-Tobacco Policy: Acadiana Coalition of Teens against Tobacco  
[http://ncth.confex.com/ncth/2002/tecprogram/paper\\_6512.htm](http://ncth.confex.com/ncth/2002/tecprogram/paper_6512.htm)

## Perceptions on Tuberculosis and its cure among the Government welfare sector providers in Chennai city, South India

Geetharamani Shanmugam, M Muniyandi, Kalaiselvi Mani

*Tuberculosis Research Centre (ICMR), Mayor V R Ramanathan Road, Chetput, Chennai, India.*

### Abstract

**Objective** - To study the perceptions on cure regarding tuberculosis (TB) among the employees working in *Adi dravidar* and Tribal Welfare department, Government of Tamil Nadu.

**Design** - An interview schedule was used to collect the socio-economic characteristics of the respondents and the data on their knowledge on symptoms, cause, mode of infection, diagnosis, treatment for TB and their perceptions on cure were collected.

**Results** - Among the 71 employees working in the Tamil Nadu government welfare origination, only ninety two percent of them have heard of the disease called TB. Forty three percent reported that cough as the main symptom, 37% reported TB was caused by germs. Out of 97% who were aware there was treatment available for TB, only 72% reported TB was curable. Disappearance of symptoms (12%) and feeling alright (25%) were perceived as the cure of TB. Only 26% reported completing the treatment for the prescribed period as cure of TB. Misconceptions reported on cure of TB were abstaining from smoking (95%), from alcohol (89%) from sex (17%) and tobacco (98%).

**Conclusions** - This study suggests for strengthening the need to educate the community in general and the other government sector in specific on symptoms and cure of TB.

**KEY WORDS** - *Tuberculosis; Perception, Cure; Misconceptions, Government welfare sector providers.*

### Background

Tuberculosis (TB) persisting, as a global public health problem of a serious magnitude requires urgent attention as it is causing a threat to the individuals and communities physically, psychologically and economically. TB is the single largest infectious cause of death among adults in the world, accounting for nearly two million deaths per year. The economic impact of TB comes from the fact that in developing countries the majority of

those affected are in the economically active segment of the population.<sup>1</sup> World Health Organization's (WHO) recommended effective TB control strategy called DOTS (Directly Observed Treatment Short-course), which is used in Revised National Tuberculosis Control Programme (RNTCP), represents the best method for controlling the global TB epidemic is reaching only 27% of the world's TB patients.<sup>2</sup> According to RNTCP the 'cured' is defined as "initially smear positive patient who has completed treatment and had negative sputum smears, on at least two occasions, one of which was at completion of treatment".<sup>3</sup> The new approach to this TB control is not only providing physical relief but also providing the social and economic relief to the patients and their families, which warrants collaboration and coordination with other welfare departments of the government sector as stake holders, to give a holistic approach to the problem of TB control. The hurdle for the successful control of TB is lack of awareness and misconceptions about TB in

#### *Correspondence to:*

Dr Geetharamani Shanmugam,  
Tuberculosis Research Centre,  
Mayor V R Ramanathan Road, Chetput,  
Chennai, 600 031, India .  
Tel: (+91) 044 28369636/2433, Fax: +91 (044) 28362528.  
Email: [geetha107@yahoo.co.in](mailto:geetha107@yahoo.co.in)

the general population, including the socially under privileged population ie. the so called Schedule Caste (SC) and Scheduled tribes (ST). In a study done in Andhra Pradesh among the tribal population it was found that only 44% of them have heard of TB.<sup>4</sup> In another study done in Tuberculosis Research Centre, among the study population of TB patients 25% males and 29% females were belonging to the SC/ST community.<sup>5</sup> This particular section of the population have been marginalized for over years from the main stream of society due to the prevailing caste system in the society. They have been deprived of all the developmental measures including health, which ultimately has hampered their lives to a greater extent. They live in poverty and do not have access to quality health care, they are vulnerable to all sorts of infectious diseases including tuberculosis due to malnutrition, overcrowding, poor ventilation and sanitation which increase the risk of infection and the probability of developing clinical disease. The TB and poverty are closely linked.<sup>6</sup> The media report of deaths of tribal children due to malnutrition in Thane district causes a great concern. These deaths were due to low weight childbirths to teenaged mothers as in other tribal areas.<sup>7</sup> The National Family Health Survey-2 indicates that nutritional status of children is intimately related to the households' standard of living.<sup>8</sup>

At this juncture it was felt necessary to look into the perceptions of TB among the government providers who take care of the welfare measures including health, to the above said SC/ST population. Hence it was decided to study the perceptions on TB and its cure among the employees working in the department of Adhi dravidar and tribal welfare, Chennai under the government of Tamil Nadu. The main objectives of this study were (1) to find out the respondents perceptions on TB with reference to its symptoms, diagnosis and treatment and (2) to assess their perceptions regarding the cure of TB.

## Materials And Methods

### Setting

The setting selected for the study was *Adhi dravidar and Tribal Welfare* department in Chennai city under the government of Tamil Nadu. This is the welfare department founded by the government of Tamil Nadu with an aim of uplifting the socially disadvantaged community ie. SC and ST all over Tamil Nadu. It is

functioning with its head quarters at Chennai city and branches in all the other 29 districts of Tamil Nadu. The objective of this department is enhancing the economic empowerment of SC and ST communities and it undertakes welfare measures in the areas such as health, family welfare, education, housing, women and child welfare, creating employment opportunities income generation programmes etc.

### Study population

Using purposive sampling method all the 71 employees working in this department at the Chennai office alone were taken as study subjects. These included right from the lowest cadre of employees to the highest cadre of employees such as the director and secretary who belong to the Indian Administrative (IAS) cadre.

### Data collection

A semi structured, pre coded interview schedule was developed to collect the data. The information to be collected through interview schedules, comprised of the respondents' knowledge on TB, mode of infection, type of treatment and understanding on cure of TB. The data was collected by trained interviewers who conducted the face-to-face interview with the respondents. Initially before the actual data was collected, each and every respondent was apprised of the purpose of the study, their informed consent was obtained and their cooperation was solicited. The data was collected for a period of three months from June to August 2001 at the Chennai office premises of the department of Adhi Dravidar and Tribal welfare.

## Results

### Characteristics of study population

This sample comprised 71 respondents of whom 30 (42%) were females and 41 (58%) were males. Socio-demographic characteristics of this study population are given in Table 1. Among them 24% belonged to the age group of 25-34 years, 32% belonged to the age group of 35-44 years and 10% were aged 55 and above. Regarding the literacy status 54% studied upto higher secondary, 32% were graduates and the rest of the 14% were postgraduates, which included the two IAS cadre officers. While looking into the monthly income of these respondents 31% were getting less than Rs 5000 and 52% were in the salary bracket of

---

Rs.5000-10000 and the rest 17% were getting Rs 10000 and above as their monthly emoluments.

### Knowledge about tuberculosis

The knowledge about TB of the respondents has been shown in Table 2. The respondents answered in multiple choices. In all, 92% of them have heard of a disease called TB and the rest of them were not aware of tuberculosis. Hence only this 92% of the employees have been considered for further analysis. Forty five percent of them came to know about TB, through neighbours, 57% of them through the television and radio and 35% through the newspapers. As far as knowledge on symptoms were concerned, 43% mentioned that cough as the symptom, 15% blood spitting as symptom and 45% loss of weight as the symptom. 15% said fever as the symptoms. Thirty seven percent reported germs as the cause for tuberculosis, 8% said that smoking caused tuberculosis, 38% told that they did not know what was causing tuberculosis. Forty nine percent reported that TB was spread through saliva; only 26% said that it is spread through air and 29% did not know. When their knowledge on diagnosis was assessed it was found that, 54% of them felt that TB could be diagnosed by sputum examination, 43% of them told that it could be diagnosed by X-ray and 34% said that it was by blood test. Ninety seven percent of the respondents agreed that there was treatment available for TB, among them 86% reported that TB could be treated only by allopathic treatment, 8% reported that TB could be treated by ayurvedic method, and another 8% reported that TB could be treated only by siddha method.

### Perception on Cure of TB

Table 3 denotes study respondents' perceptions on cure of TB. TB was perceived as a curable disease

only by 72% of the respondents. Among these respondents, completing the prescribed course of treatment as per doctors' advice was perceived as a cure of TB by 17% of the males and 14% of females. Twenty percent of the 45 years or less aged and 11% of the above 45 years aged respondents and 14% of the respondents with more than higher secondary level of education and 15% of the respondents who have studied upto higher secondary level or less have also said that cure is completing the prescribed treatment. Disappearance of symptoms as cure of TB, was perceived by 8% of the below 45 years aged and 5% of the above 45 years of aged, 9% of males 3% of females and 9% of the respondents studied upto higher secondary level and 3% of respondents studied above higher secondary level. Just feeling 'all right' as the cure of TB was perceived by 15% of males, 29% of females, 18% of 45 or less years, 12% of the above 45 years, 14% of both educated upto higher secondary level and above higher secondary level.

### Misconceptions on cure regarding TB

There were some misconceptions perceived by the study population regarding the cure of TB as shown in figure 1. They believed that TB could be cured even without medicine when practising the following things like, abstaining from sex as perceived by (17%), abstaining from doing hard work (29%), abstaining from smoking (95%), abstaining from alcohol (89%) and abstaining from tobacco chewing (98%). Some more misconceptions were also perceived by these respondents as shown in figure 2. They felt the following measures should be taken in addition to the prescribed medicine to get cured from TB fully. They were, giving hospitalized care to the TB patients as perceived by 49% of respondents, giving special food as perceived by 89% and providing absolute rest as perceived by 46% of the respondents.

Table 1. Demographic and Socio-economic characteristics of respondents (n=71)

		No	%
Age	25-34	17	24
	35-44	23	32
	45-54	24	34
	55+	7	10
Sex	Male	30	42
	Female	41	58
Education	<Hr Sec	38	54
	>Hr Sec	33	46
Income/month in Rs	<5000	22	31
	5-10 000	37	52
	>10001	12	17

Table 2. Perceptions on knowledge about tuberculosis (n=65)

		No	%
Sources	Neighbors	29	45
	TV/Radio	37	57
	Newspaper	23	35
	Patients	24	37
	Others	6	9
Symptoms	Cough	28	43
	Loss of weight	29	45
	Chest pain	3	5
	Breathlessness	3	5
	Blood spitting	10	15
	Others	20	31
Causes	Germes	24	37
	Smoking	5	8
	Alcohol	6	9
	Mosquito	3	5
	Others	8	12
	Dint know	25	38
Mode of transmission	Saliva	32	49
	Air	17	26
	Flies	3	5
	Don't know	19	29
Diagnosis	Sputum test	35	54
	X-ray	28	43
	Blood test	22	34
	Don't know	19	29
Treatment	Allopathic	56	86
	Ayurvedic	5	8
	Sidha	5	8
	Homeopathy	5	8

Multiple answered

Table 3. Perceptions on cure of tuberculosis (n=65)

		Till symptoms Disappear		Felt alright		Complete prescription		Others	
		No	%	No	%	No	%	No	%
		<b>Age</b>	<45 years	5	8	12	18	13	20
	>45 years	4	5	8	12	7	11	13	20
<b>Sex</b>	Male	6	9	11	29	11	17	17	26
	Female	2	3	7	15	9	14	10	15
<b>Education</b>	< Hr Sec	6	9	9	14	10	15	16	25
	>Hr Sec	2	3	9	14	9	14	12	18

Multiple answered

Fig 1. Misconceptions on cure of tuberculosis

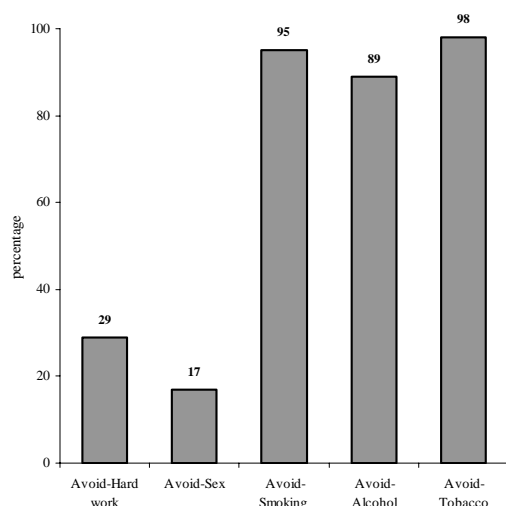
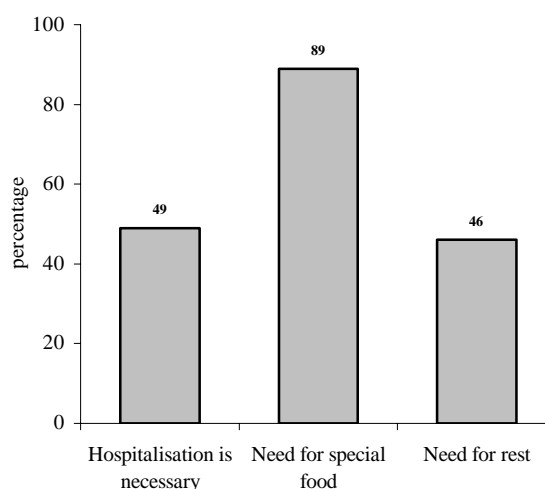


Fig 2. Misconceptions on additional measures for the cure of tuberculosis



## Discussion

There have been studies to assess the level of awareness of tuberculosis among the various group of people, but only very few studies, on the peoples' perceptions, specially on the cure of tuberculosis. These studies have shown lack of awareness among patients and general population with respect to etiology, signs and symptoms and management of tuberculosis.<sup>9</sup> Success of any health programme will depend upon whether the target groups are aware of its existence and are willing to participate in it. National Tuberculosis Control Programme has been in place over the decades, information about the programme and its

benefits are yet to reach the people adequately.<sup>10</sup> Studies have been done in India to find about TB awareness in the general community but the value of the present study emphasizes specially on a particular sector of the society, the government welfare providers' perceptions on cure of TB. In the present study 37% of the respondents were aware that TB is caused by a germ, 38% of them did not know the symptoms, 57% of them reported TV/Radio were the main sources of their information to get the knowledge on TB. In similar study done by Rajeswari et al to find out TB awareness among the educated public, it was found that 86% of the respondents said that TB germs caused the disease, and for them books and magazines were the main source of information on



---

TB.<sup>11</sup> In this present study more than 50% of them did not have any idea on the specific symptoms on TB, and 29% did not know how it is transmitted. TB treatment is lengthy, symptoms can subside before course completion and the drugs prescribed can give side effects. Seventy six percent of patients who defaulted this treatment by the end of intensive phase, a period during which the symptoms usually decline, patients identified by community survey who are less likely to be symptomatic were more likely to default.<sup>12</sup>

In this study 92% of the respondents were aware of TB and among them 97% were aware that treatment is available to cure this disease. Similarly in a community study conducted in Bombay more urban (78%) households believed that TB is curable. In this study, disappearance of symptoms and feeling alright were perceived as cure of TB by 11% and 25% the study population. Only one fourth of the respondents reported that cure from TB could be achieved only by completing the full prescribed treatment as per the doctors' advice. Even in the study by Rajeswari et al 28% of the respondents felt that treatment for TB is continued only till the symptoms disappeared.<sup>11</sup>

Some of the misconceptions perceived by the respondents in this study were, abstaining from smoking, alcohol, tobacco chewing and taking special diet, in addition to the TB treatment, for getting the complete cure. Besides, abstaining from hard work (29%), sex (17%) and need for hospitalization (49%) were also the misconceptions the respondents had, in order to get the complete cure, in addition to the prescribed treatment for TB. In the study done by Rajeswari et al also the respondents had mentioned the need for nutritious diet and bed rest for getting cure in TB.<sup>11</sup>

Similarly a study done by Administrative Staff College India (ASCI) in Medak district, "It is understood by most that TB is curable and that to recover from TB it is thought necessary to take medicine, eat bland food and abstain from sex"<sup>13</sup> According to the study conducted in Delhi, "most of the patients believed that TB was curable, if medicine were taken regularly and 20% of the patients believed that treatment in hospital was necessary"<sup>14</sup> In the other report from Bombay, the finding on perception on the curability of TB was that people believe TB to be curable as long as specific

"dietary, social and cultural norms are followed" where people believe that the illness is caused by these norms.<sup>15</sup>

### Limitations of the study

This study has got its own limitations of having interviewed only the employees working in Chennai office of the department of Adi dravidar and tribal welfare. The present study outcomes are from the respondents belonging to a metro area i.e. Chennai and it is worthwhile to repeat the same exercise among the employees of the same department who are living in other rural and urban districts of Tamil Nadu.

### Conclusion

This study suggests the needs to sensitize all the government welfare sector providers on tuberculosis, who can be tied up to the TB activities in order to achieve the desired target of TB control by 2005. Convergence of resources and services seemed the best way of tackling the problem within the restricted time frame. This strategy is already in practice in the district of Nilgris. In the recent removal of malnutrition programme among the children in the district the plan of action drawn for the district, harnessed all links of governance - Health and Revenue Departments, the hill area development programme, Integrated child development services scheme, local panchayats and local power groups like women self help groups and non government organizations.<sup>16</sup> Similar strategy can be adopted in the TB control programme by spelling out the role of each of the partners. A multisectoral approach incorporating private and government welfare sectors and community, through advocacy, social mobilization, can be the best way for the TB control.<sup>17</sup>

### Acknowledgement

The authors thank Dr V Kumarswamy, Deputy Director Senior Grade, Tuberculosis Research center, Chennai for his valuable guidance and support. They would like to thank all employees including the Director and Secretary of the department of Adhi Dravidar and Tribal welfare, Government of Tamil Nadu for providing the necessary support for the successful conduct of the study. The authors are grateful to the Director, Tuberculosis Research Centre, Chennai for having permitted to conduct this study.

---

## References

1. Bulletin of Indian Council of Medical Research. March 2002 (32):3.
2. World Health Organization. The global plan to stop tuberculosis. Stop TB Partnership 2001, WHO/CDS/STB/2001.16.
3. Central TB Division, DGHS. RNTCP at a glance. Ministry of Health and Family Welfare, New Delhi 2000.
4. K Jagga Rajamma, D Vijaya Baskara Rao, ASL Narayana, Rajeswari R, R Prabhakar. Health seeking behaviour, acceptability of available health facilities and knowledge about tuberculosis in a tribal area. *Ind J Tub*, 1996, 43: 195-199.
5. Rajeswari R, R Balasubramanian, M Muniyandi, S Geetharamani, X Therasa, P Venkatesan. Socio economic impact of tuberculosis on patients and family in India. *Int J Tuberc Lung Dis* 1999; 3 (10): 869-877.
6. TB India 2002 - RNTCP status report, Central TB Division, DGHS. Ministry of Health and Family Welfare, New Delhi 2000.
7. Mahesh Vijapurkar. Concern over infant deaths in Maharashtra. *The hindu* 3<sup>rd</sup> September 2002; Chennai.
8. National Family Health Survey 1998-99 (NFHS-2). International Institute for Population Sciences, Mumbai.
9. Geetha Krishna, K Pappu, Roy Chowhury. A study on knowledge and attitude towards tuberculosis in a rural area of West Bengal. *Ind J Tuib* 1990; 69-74.
10. Hadley M, D Maher. Community involvement in tuberculosis control: lessons from other health care programmes. *Int J Tuberc Lung Dis* 4(5): 401-408.
11. Rajeswari Ramachadran. Tuberculosis among educated public in two cities in Tamil Nadu. *Lung India* 1995; 13 (3 & 4): 108-113.
12. T Santha, R Garg, TR Frieden, V Chandrasekaran, R Subramani, PG Gopi, N Selvakumar, S Ganapathy, N Charles, J Rajamma, PR Narayanan. Risk factors associated with default, failure and death among tuberculosis patients treated in a DOTS programme: Trivallur district, south India. *Int J Tuberc Lung Dis* 2002; 6(9): 780-788.
13. Administrative Staff College India. RNTCP implementation in Medak District, Sandra Predesh: An Operational Research Study. Department of International Development, India 1997.
14. Lala Ram Swarup Institute of Tuberculosis and Allied Diseases. Operations research to assess needs and perspectives of TB patients and provides of TB care in Delhi. Department of International Development, India 1997.
15. Foundation for Research in Community Health. Tuberculosis control: a state of the art review. Department of International Development, India 1997.
16. Ramya Kannan. Healthy, timely project for Nilgiris children. *The Hindu* 1st September 2002; Chennai.
17. World health Organization. 50 years: Historical review 50 months: Countdown to a TB free future. *Towards a TB free future* 2002; 12.

## Understanding the Hidden Burden of Tuberculosis in a District of Eastern Nepal

N. Jha<sup>1</sup>, P. K. Pokharel<sup>2</sup>, S Koirala<sup>3</sup>, S. K. Bhattacharya<sup>4</sup>, B. M. S. Karki<sup>5</sup>, R. K. Rauniyar<sup>6</sup>, D. D. Baral<sup>7</sup>

*1 Additional Professor, Dept. of Community Medicine, 2 Associate Professor, Dept. of Community Medicine, 3 Former Vice-chancellor, 4 Additional Professor, Dept. of Microbiology, 5. Associate Professor, Dept of Microbiology, 6. Associate Professor, Dept of Radiology, 7. Senior instructor, Medical Record Section, B. P. Koirala Institute of Health Sciences, Dharan, Nepal*

### Abstract

Tuberculosis (TB) is one of the major public health problems in Nepal. About 45% of the total population is infected with TB. Of the infected, 60% are in the productive age group. Every year 44000 people develop active TB, of whom 20000 have infectious pulmonary disease and are capable of spreading the disease. The National Tuberculosis Program (NTP) in Nepal is an approach within the National Health System to control TB. The main strategy of NTP is to diagnose, treat and cure patients with TB, especially sputum positive cases through Directly Observed Treatment Short course (DOTS).

The aim of this study was to understand the hidden burden of TB in a district of eastern Nepal through active surveillance. The active surveillance for TB cases was conducted between May 1999 to August 1999 by a team from B. P. Koirala Institute of Health Sciences, Dharan, and WHO in Sunsari district.

A total of 5054 respondents were interviewed and examined for TB. The sputum examination and chest x-ray were done for chest symptomatic. The prevalence rate of sputum positive TB among the surveyed population was 1.8 per 1000 persons in a year. Similarly the prevalence rate of chest x-ray positive for cases was 6.2 per 1000 persons in a year. These are the hidden burden of TB cases in the community, which help in the dynamics of disease transmission.

*Key Words: TB, Surveillance, Nepal, DOTS.*

### Introduction

Globally, there are more than eight million cases and two to three million deaths from tuberculosis every year, and nearly 200 million people have died of tuberculosis in the 20<sup>th</sup> century.<sup>1</sup>

TB is the major health concern in south- East Asia Region. With three million new infectious cases and close to a quarter of a million deaths are annually due to TB. The region accounts for nearly 40 Percent of the global burden of TB.<sup>2</sup>

TB is one of the major public health problem is Nepal. About 45% of the total population is infected with TB. Of the infected, 60 percent are in the

productive age group. Every year 44,000 people develop active TB, of whom 20,000 have infectious pulmonary disease and are capable of spreading the disease to others.<sup>3</sup>

The National Tuberculosis Program (NTP) in Nepal is an approach within the National Health System to control TB. The main strategy of NTP is to diagnose, treat and cure patients with TB, especially sputum positive smear cases through Directly Observed Treatment Short Course (DOTS).<sup>4</sup>

Methods used to assess the true burden of TB in developing countries are imprecise.<sup>5</sup> Where Countries have an established surveillance system, data are considered reliable and preferable.<sup>6</sup>

For such information to accurately reflect incidence, the accessibility of medical services and quality of record keeping must be high. Consequently, in many countries these data have the potential to

#### *Correspondence to*

Dr. N. Jha, Additional Professor,  
Dept. of Community Medicine, BP Koirala Institute of  
Health Science, Dharan, Nepal.  
E-mail: niljha@yahoo.com

---

seriously underestimate the burden of disease.<sup>5</sup> In Nepal, the NTP has improved its recording and reporting as well as its data analysis systems. In every trimester, DOTS recording and reporting workshop at districts level, recording, reporting and planning meetings at the regional level, and recording, reporting and planning workshop at the national level are being conducted.<sup>3</sup> Health Workers, who are working at Sub Health Posts, Health Posts, Primary Health Centers are convinced about the TB control program and are providing services to TB patients in order to achieve their full course of treatment.<sup>3</sup> The aim of this study was to understand the hidden burden of TB in a district of Eastern Nepal through active surveillance.

### Materials and Methods

The surveillance for TB cases was conducted between May 1999 to August 1999 by a team from B.P. Koirala Institute of Health Sciences (BPKIHS) and WHO, Nepal in Sunsari district.

The team consisted of physician, community physicians, epidemiologists, microbiologists, radiologist and statistician from BPKIHS. Medical officer (TB) from WHO, Nepal worked as advisor. Other members of the team were laboratory technician, radiographer and six auxiliary health workers (AHW) as enumerators. The enumerators were selected after an interview. One-day orientation was conducted for all the team members about the program and actual method of surveillance. The coordinator led the team from the department of community medicine.

Active surveillance was done, which consisted of house-to-house survey by the AHWs with the help of questionnaire. For active surveillance, a sample size was calculated based on the prevalence rate of 5/1000 for sputum positive cases in Sunsari district (Sunsari Health Examination Survey 1996). Thus total sample size was 4975, which was drawn from the total population of Sunsari district (463481). This sample size was taken from all 11 tuberculosis treatment areas (8 Health Posts and 3 Primary Health Care centres) in Sunsari district including one DOTS centre. Total sampled population was divided into 11 such areas by population proportion method. From each treatment area, one village development committee or municipality was chosen randomly. After discussion with health worker at the treatment center, ward with high prevalence of

tuberculosis was taken as basic unit for the surveillance.

A list of patient on anti tuberculosis treatment was obtained from each treatment centre for active surveillance. The enumerators interviewed and examine 20 individuals (age more than 6 years) present around one sputum positive tuberculosis case (on anti tuberculosis drugs) in that village/town at the time of survey with the help of a questionnaire. The questionnaire contained identification data, presenting complains, past history of tuberculosis, treatment history, family history, general examination and systematic examination.

The individuals with more than 3 weeks of cough (Chest symptomatic) were subjected to sputum examination. The two Sputum Samples from each individual were collected by laboratory technician and brought to the department of Microbiology, BPKIHS and examined by microbiologist. The sputum negative cases were subjected to chest x-ray. The chest x-rays were examined by radiologist. The individuals with sputum positive and chest x-ray positive for tuberculosis were referred to the nearest tuberculosis treatment centre. The investigators and program coordinator closely supervised the whole process of data collection, diagnosis and treatment. The cases were followed according to the National Tuberculosis program.

The data were entered into computer under supervision of statistician and program coordinator. The analysis of the data was done with the help of a statistician.

### Results

A total of 5054 respondents were interviewed and examined for tuberculosis. These individuals were well distributed throughout the district. The highest number (27.9%) of individuals were in age group of 10 to 19 years (Table 1). The median age was 23 years. There were 51.2% male among the surveyed population. Majority (88.6%) of them were Hindu by religion. The highest number (41.3%) of people were illiterate. The students were 31.0% by occupation, followed by 26.4% housewife and 16.5% labourers. Half of the sample had income in between NRs 100 to 500 per month per person.

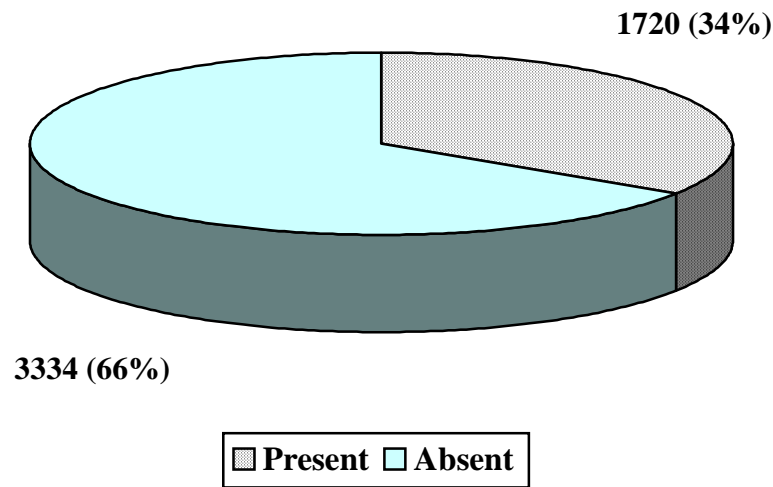
Among them, 4.5%, 2.6% and 3.4% of the individuals had cough, fever and chest pain respectively. There was no history of haemoptysis in a single individual. There were 536 (10.6 %) individuals had cough more than three weeks. These are the chest symptomatic people. Only 115 (2.3%) respondents gave history of tuberculosis in the past. Majority (90%) of them had suffered from sputum positive pulmonary tuberculosis. Among them, 85% had completed their treatment for tuberculosis at various health facilities of Sunsari district.

More than one third of the people gave the family history of tuberculosis (Figure 1). About 95% population had BCG scar. Out of 5054-surveyed population, 9 were found to be sputum positive for pulmonary tuberculosis and 31 sputum negative but chest x-ray positive pulmonary tuberculosis. Therefore, the prevalence rate of sputum positive tuberculosis among the surveyed people in Sunsari district is 1.8 per 1000 persons in a year. Similarly the prevalence rate for chest x-ray positive pulmonary tuberculosis is 6.2 per 1000 persons in a year. These cases were subjected for treatment at respective health facilities of Sunsari district under National Tuberculosis Program. The treatment of all TB cases was completed but one case among sputum positive was found to be drugs resistant. The knowledge about the prevention and control of tuberculosis was very poor in 89.4% of the respondents.

Table 1. Characteristics of the Respondents

Characteristics	Number	Percentage
<u>Age group (Years)</u>		
6-9	667	13.1
10-19	1408	27.9
20-29	1074	21.3
30-39	766	15.2
40-49	508	10.1
50-59	322	6.4
60 and above	309	6.1
Total	5054	100.0
<u>Sex</u>		
Male	2588	51.2
Female	2466	48.8
Total	5054	100%
<u>Religion</u>		
Hindu	4479	88.6
Muslim	439	8.7
Buddhist	136	2.7
Christian	3	0.1
Total	5054	100
<u>Education</u>		
Primary	1258	24.9
Middle	699	13.8
Secondary	521	10.3
Matriculation	242	4.8
Intermediate	162	3.2
Bachelor & Above	70	1.4
Illiterate	2089	41.3
Not applicable*	13	0.3
Total	5054	100.0
<u>Occupation</u>		
Agriculture	496	9.8
Laborer	835	16.5
Service	266	5.3
Business	164	3.2
Student	1568	31.0
Housewife	1332	26.4
Not applicable**	369	7.3
Others	24	0.4
Total	5054	100

Figure 1 Family history of Tuberculosis



#### Discussion

Information on epidemiological trends in tuberculosis is of great importance for planning, monitoring and evaluating NTPs. Reliable data on the subjects are seldom available in developing countries with a heavy burden of disease. This is because efficient notification systems are not in place. Every time surveys and special studies are difficult to organize and are expensive.

Data on point prevalence have been presented to compare the number of patients being treated for TB by the health system and patient with undetected TB in the community. Our work found the prevalence rate of sputum positive pulmonary TB cases was 1.8 per 1000 persons in a year among the undiagnosed pulmonary TB in the community. It is important to note that cases identified by active surveillance had often been coughing for an extended period and may contribute disproportionately to the duration of infectiousness in the community.

The generalisability of this work to other regions relates to a number of biological and social factors that broadly define a population's vulnerability to tuberculosis. Within Nepal itself, levels of social development vary widely from region to region and from hill, mountain and terai.

The annual risk of infection and incidence of TB varies from hill, mountain to terai and village to town. While Nepal is considered a poor country, the level of human development index is low. Poverty and tuberculosis are associated strongly. More than one third Nepali live below poverty line and TB is their lifetime friend.

It is important to underscore methodological differences in assessing the strengths and limitations of a particular active case finding approach. In this study, active case finding centered on a single symptom like chronic cough more than three weeks and history of TB in the family and contact tracing. Data from Kenya employing diverse active case finding strategies have suggested this method to be the most successful in identifying active cases in the community.<sup>7</sup>

Strategies to identify TB suspects from other countries have differed widely, and have included multiple interrogation of elders or village leaders, surveys of household heads, contact tracing among registered patients and TB suspects and public broadcast messages.<sup>7,8,9,10</sup>

A variety of Screening methodologies have been employed including purified protein derivative testing, chest radiography, or surveillance for cardinal symptoms including cough (of 2-4

---

weeks), haemoptysis, weight loss and or generalized weakness.<sup>7,9,11,12,13</sup>

Sampling approaches varied from population-based approach to cluster design.<sup>11,12</sup> Diagnostic modalities such as chest radiography, sputum smear assessment, and culture collection have all been employed.<sup>12</sup> Unfortunately, differentiating between patients who have already been identified by the health service and those previously undiagnosed has been reported inconsistently by researchers. The ratio of active cases and chronic coughers to the population sampled has significant implications in terms of the cost and feasibility of active case finding programs. Based on our data of individuals were identified as TB suspects using the chronic cough question posed to household heads. This is low compared to findings from studies conducted in Papua New Guinea (22%)<sup>14</sup>, Kenya (5%)<sup>7</sup>, Uganda (5%)<sup>15</sup>, Burma (4.1%)<sup>16</sup>, Singapore (2.5%)<sup>17</sup> and South Africa (1.5%)<sup>18</sup>.

The ratio of TB suspects and sputum positive cases in our study were one case per 23 suspects, a higher yield than acknowledged in the literatures where a ratio of 61 and 100 suspects per case is generally cited.<sup>7, 18,19</sup>

Existing strategies for the control of tuberculosis emphasis case detection among symptomatic individuals presenting to the health service, and treatment completion through Directly Observed Therapy Short Course (DOTS).<sup>20</sup>

Critics argue, however, that this approach was developed well before the HIV/AIDS era, and takes no account of the dynamic epidemiology of HIV-related tuberculosis.<sup>21</sup>

Even countries with model DOTS programs, such as Tanzania, Thailand or Botswana, have witnessed increasing TB transmission, largely a consequence of high rates of co-infection with HIV.<sup>21,22,23</sup>

De Cock and Chaisson noted that given a growing prevalence of undiagnosed active TB in HIV-positive persons, active case finding strategies might be considered as a means to interrupt on going transmission. They advocate

this approach in all setting that concentrate HIV infected persons such as hospitals, prisons and a more widespread application in areas of highest HIV prevalence, particularly among the family member of HIV positive TB patients.<sup>21</sup> In review of four model approaches to active case finding. Murray and Solomon concluded that when coupled to an effective DOTS strategy, active case finding reduce tuberculosis mortality by one quarter to one-third over the next several decades and has the potential to yield enormous benefits in high prevalence regions.<sup>19</sup>

In this study a single interrogation of household heads identified a modest burden of undiagnosed TB in a Nepalese Community. It remains unknown to what extent these individuals serve as a reservoir for ongoing transmission in the community. Further more to what extent would reduce their time to influence the dynamics of transmission in the community? In developed countries, active case finding strategies have largely been diminished, on the basis that while such interventions might diagnose active case as an earlier stage, most individuals will nevertheless access health services and be detected.<sup>24</sup>

This study detected nine previously undiagnosed cases of sputum positive pulmonary TB among a population of 5054. While contributing disproportionately to the duration of infectiousness in the community most had accessed health services at some point during their illness. As such, in the context of Nepal, which has a reasonably well-developed infrastructure of primary health care system. It seems unlikely that the resources necessary to structured effective active case finding campaigns will prove a cost effective means to reduce the burden of TB in population. Some studies related to health seeking behaviour of the people must be done to know why these sputum positive cases have not gone to health facilities to receive the treatment. Where is fault, must be identified? It is the care providers, care receivers or the system. The pockets of the population, which are very poor needs to observed closely. The occasional survey can pick up the undiagnosed cases, to reduce the burden of TB and increases the effectiveness of the program.

## Acknowledgement

The authors are grateful to Dr. Ian Smith and Dr. P.T. Jayawickramaraj, WHO Nepal for their valuable contribution for the completion of this study. We also express our thanks to WHO, Nepal for the financial support for this study.

## References

1. WHO, TB deaths reach historic levels (Press Release). WHO:96/22. Geneva: WHO 1996.
2. WHO, Regional office for South East Asia. Enhancing the Role of Medical School in STD/ HIV and TB. Control 2000:1.
3. HMG. Ministry of Health, Dept. of Health Services. Annual Report 1998/1999.
4. HMG. Ministry of Health, Department of Health Services. National TB Program of Nepal, General Manual 1997:1.
5. Grange JM. The global burden of tuberculosis – In: porter JDH, Grange JM, eds. Tuberculosis an interdisciplinary perspective. London: Imperical College, 1999:pp3-32
6. Dolin PJ, Raviglione MC, Kochi A. Global TB incidence and mortality during 1990-2000. Bull World Health Organization 1994;72:213-220.
7. Aluoch JA, Edwards EA, Stott H, Fox W, Sutherland I . A fourth study of case finding methods for pulmonary tuberculosis in Kenya, Trans Roy soc Trop Med Hyg 1982;76: 679-691.
8. Poverty and inequality in South Africa. In: May J ed. Durban: Praxis Publishing, 1998:p21.
9. Aluoch JA, Swai OB, Edwards EA, et al. Studies of case finding for pulmonary tuberculosis in outpatients at 4 district hospitals in Kenya. Tubercle 1985; 66: 237-249.
10. Elink Schurman MW, Srisaehpang S, Pinistoontron S, Brijleveld I, Vateewoo thanacharn K, Methopat C. The rapid village survey in tuberculosis control , Tubercle Lung Dis 1996; 77: 549-554.
11. Banerji D, Andersen S. A Sociological study of awareness of symptoms among persons with pulmonary tuberculosis . Bull World Health Organization 1963; 29: 665-683.
12. Tupasic TE, Radha krishna S, Quelapio MID. Tuberculosis in the urban poor settlements in the Philippines. Int. J Tuberc lung Dis 2000; 4: 4-11.
13. Gothi GD, Naryan R, Nairs S, Chakraborty AK, Srikantaramu N. Estimation of prevalence of bacillary tuberculosis on the basis of chest x-ray and / or symptomatic screening. India J Med has 1976; 64: 1150-1159.
14. Pust RE. The risk factor approach to sputum smear diagnosis. World Health forum 1982; 3: 78-80.
15. Smith PG, Revill WD. The Prevalence of persistent coughs in a rural Community in the Lango district of Uganda. Tubercle 1977; 58: 157-159.
16. Ministry of Health of the Government of Burma. Tuberculosis baseline survey in Burma in 1972. Tubercle 1974; 55: 313-325
17. Ministry of Health, Singapore. Tuberculosis prevalence survey 1975. Singapore: Ministry of Health, 1975.
18. Pronyk PM , Joshi, B, Hargreaves JR, Mandonsela T, Collision MA, Mokoena O, Tollman SM, Hausler HP. Active case finding: Understanding the burden of tuberculosis in rural South Africa. Int J Tuberc Lung Dis 2001; 5 (7): 611-618.
19. Murray CM, Salomon JA. Expanding the WHO tuberculosis control strategy: rethinking the role of active-case finding. Int J Tuberc Lung Dis 1998; 2 (suppl I): s9- s15.
20. World Health Organization. Framework for effective tuberculosis control. Geneva: WHO. 1994.
21. De cock KM, Chaisson RE. Will DOTS do it? A reappraisal of tuberculosis control in countries with high rates of HIV infections. Int J Tuberc Lung Dis. 1999; 3: 457-464.
22. Raviglione MC, Harries AD, Msiska R, Wilkinson D, Nunn P. Tuberculosis and HIV: Current status in Africa. AIDS 1997; 11 (Suppl B) : S115-S123.
23. Yanai H, Uthavivoravit W, Panich V, et al , Rapid increase in HIV related tuberculosis, Chiang Rai , Thailand , 1990-1994. AIDS 1996; 10:527-531.
24. Tomas K. Tuberculosis case finding and chemotherapy: questions and Answers. Geneva: World Health organization, 1979.



## Prevention of Transmission of Blood-borne Infections HIV, Hepatitis B and Hepatitis C in the Health Care Setting Manual

Dr. D. L. Singh

*Visiting Professor, National Academy of Medical Sciences, Bir Hospital, Kathmandu, Nepal.*

I reviewed the book "Prevention of Transmission of Blood-borne Infections HIV, Hepatitis B and Hepatitis C in Health Care Setting Manual" written by Dr. Madhur Dev Bhattarai with interest. The book is divided into two broad sections, one section with 5 objectives and another with appendices and pre-test questionnaires and answers. I found the division quite important, as it clearly highlights the major areas to be given the attention with other required issues covered in the appendices. Otherwise the 5 objectives could have been lost in the maze of information.

The basic principles of "Universal Precautions" and "Infection Control Measures" are explained in a simple manner. The concept of "Infection Control Measures" to prevent transmission of blood-borne infections from patients to patients is useful. "Proper disposal and incineration of syringes and needles" covered in the objective 2 and "Decontamination of used instruments and other items before cleaning" covered in the objective 3 protect the nurses and phlebotomists and health care workers who clean the used instruments from blood-borne infections respectively. The importance of decontamination before cleaning the instruments is explained in the book and is vital in the developing countries, as instruments are washed by hands.

### *Correspondence to*

Dr D L Singh  
Visiting Professor  
National Academy of Medical Sciences  
Bir Hospital, GPO Box 13606  
Kathmandu, Nepal.  
Tel 4230710 (O), 5521624 (R)  
E-mail: names@healthnet.org.np

But decontamination of instruments before cleaning is fairly a new concept for health care workers in the region and needs emphasis. This has been done adequately in the book. It is rightly highlighted in the book that even if standard incineration is not available and other hospital wastes are not managed properly, disposal and incineration of syringes and needles have to be carried out to protect health care workers from needle-stick injuries and the risk of transmission of blood-borne infections. Merely advising health care workers to avoid recapping of needles is not sufficient, proper system of disposal and incineration of needles and syringes should be made available. The details of proper disposal and incineration of syringes and needles and decontamination are described sufficiently and considered for the resource poor settings. The book highlights that in the health care setting there is risk of patient-to-patient transmission of blood-borne infections, which can occur through contaminated needles, syringes, gloves and various instruments and through blood transfusion etc. Measures to be taken to organize the provision of only sterilized or high-level disinfected instruments are adequately covered.

Details of universal precautions are covered in the appendix 3 and of instruments, procedures and situations, including the use of multi-dose vial, likely to transmit HIV, HBV and HCV from one patient to another in the appendix 4. All health care workers including experienced doctors will find the sections quite useful. It seems rightly highlighted in the book that the health care setting may be next to commercial sex as high risk situation for HIV transmission in the general population in many developing countries. The poster showing the three safety signs to prevent transmission of HIV and

hepatitis B and C is quite useful. It not only facilitates the easy communication but also regularly reminds the health care workers and management about the three most important categories of precautions required in the health care settings. Protection of staffs and patients under one's care is not just an issue of control or prevention of blood-borne infections but it is a question of basic ethic of medical practice. Similarly, without basic safety in the health care settings no wonder if the people with HIV/AIDS are not well accepted by health workers with resultant suffering of their care and support.

The concept of protection of general waste of hospitals from infectious waste covered in the appendix 7 about the waste disposal in the health care setting is briefly but rightly highlighted. The infectious waste which only constitute 25% of hospitals continue to contaminate the wastes of hospitals and of community in many developing countries and thus possibly spread the resistant

organisms in the world. The complexities and limitations of the tests of HIV are covered in the appendices 8 and 9 will help to sensitize the health care workers. HIV/AIDS control programme rightly included in the manual covers adequately the major concepts involved.

There are some printing errors, but the overall quality of book is good. There are many simple illustration and diagrams for easy explanation. The book is worth recommending for health care workers and managers. The issues covered in the book need to be included in the curriculum of health care workers of all categories and levels. The book appears to be published only in limited number. It needs to be published for wider circulation by international organizations, so that the issues are considered seriously in the developing countries like Nepal.

