Tuberculosis Control: Detect and Treat Infection in Children

"Where there is no primary health care, public health will founder."

In January 2000, *Indian Pediatrics* carried an Editorial titled "Tuberculosis control, without protection from BCG"(1). The final report on the BCG vaccine trial in Chingleput district in Tamil Nadu, published in 1999, had shown no protection against infection with *Mycobacterium tuberculosis* (*MTb*) or against the progression of infection to tuberculosis (TB), especially bacillary pulmonary disease(2). The national TB control program had two interventions intended to reduce the incidence of infection – universal BCG and treatment of pulmonary TB(3). Now that BCG had no role in TB control, only one intervention remained valid. A by-product of the Chingleput study was to show no discernible decline in incidence of *MTb* infection in spite of 'research quality' case detection and treatment of pulmonary TB over 15 years(1,2). So, case detection and treatment alone will not control TB(1). The Editorial recommended several improvements on the national TB control efforts(1). Two items concerned with child health were as follows. One, the need to screen children in contact with every adult diagnosed with active TB, in order to detect infected children for further management; and the Second, the need to conduct regular periodic tuberculin surveys at district and sub-district levels to monitor the program. It was predicted that TB will not be controlled in the country as long as childhood *MTb* infection is neglected(1).

In the 2008 (January 17-20) Annual National Conference of the Indian Academy of Pediatrics (IAP) at Bhubaneswar, there was a report on children in contact with adults with pulmonary TB(4). Among 100 such children, Mantoux (PPD) test was positive in 27% and 'BCG test' was positive in 72%. Chest *X*-ray, taken in those positive in either test, showed signs of TB in 55 children, half among BCG-vaccinated and half in unvaccinated children(4). This illustrates the magnitude of neglected childhood TB. It took a specific 'research study' to screen children in contact with adult TB, whereas it should have been routine as part of primary health care(1,4). Under the present conditions of regimented 'vertical' central-government-sponsored scheme of TB control and grossly inadequate primary health care, most children ill or infected due to *MTb* do not get the care they deserve(5-7).

If infected children are not treated early, a few will develop early TB and a proportion will develop late TB and continue the transmission cycle. This is the rationale of chemoprophylaxis (preventive treatment), to minimize the frequency of disease in the individual and of future transmission(6,7). Thus, screening children in contact with anyone with TB is in the best interest of the child for personal health and of the community at large for disease control – in other words, ethical clinical pediatrics and effective public health. The current IAP guidelines for treating children with TB include preventive treatment in all Mantoux (PPD) test positive under-2 children(5). Not only under-2, but all children with recent infection deserve treatment(1,5-7).

The Directorate General of Health Services (DGHS) of the Government of India (GoI) has accepted the International Standards for Tuberculosis Care, Diagnosis, Treatment and Public Health, recently developed by the TB Coalition for Technical Assistance(6). Accordingly, "all providers of care for patients with tuberculosis should ensure that persons who are in close contact with patients who have infectious tuberculosis are evaluated and managed in line with international recommendations. Children under 5 years of age and persons with HIV infection who have been in contact with an infectious case should be evaluated for both latent infection with *M. tuberculosis* and active tuberculosis"(6). It is now imperative to systematize and institutionalize screening of all contacts of active TB. The manner in which the national TB control

program is organized does not have the capacity for routine screening of contacts for *MTb* infection and disease. The ideal channel to achieve it is through primary health care(1). It will be appropriate for IAP to articulate its policy on preventive treatment for all recent PPD converters and all under-five children with latent *MTb* infection, in accordance with international norms(6,7). Furthermore, IAP has the academic obligation to state its views on the adequacy of current primary health care for children and of public health interventions for TB control.

The second recommendation in the previous Editorial was for systematic PPD test surveys to monitor time-trend of prevalence and of annual rate of *MTb* infection (ARTI)(1). The degree of control desired by the DGHS/GoI is very low frequency of infection – specifically <1% infection by age 14 years, translated as mean 0.07% ARTI for every year of life up to 14(1,8,9). It is gratifying to note that this recommendation has resulted in a series of surveys in different geographic locations – east, west, north and south of the country(10-16). Independent investigators have also conducted PPD surveys in Haryana and in Trivandrum and Palakkad districts in Kerala(17-19). Most surveys were in children of 5 years and above. In general it can be stated that the ARTI remains around 1%, with some geographic variations(10-19).

What do we compare these data with? How much has ARTI declined against the goal to bring down infection prevalence to <1% by age 14? Two earlier PPD surveys that I am familiar with were conducted at around 1970(20,21). They had shown infection prevalence rates of 1-2% below 5 years and 15-17% by age 15 years(20,21). One could deduce from these data that the ARTI was well below 1% among children under 5 and a little over 1% in older children(20,21). Thus, between 1970s and 2000s virtually no decline of infection rate has occurred in school-age children. This is indeed disconcerting as it appears that decades of TB control efforts using just one effective intervention have not reduced appreciably the incidence of infection in children since 1970s. In the interim, new problems have cropped up – including the epidemic of human immunodeficiency virus infection(22) with its synergy with tuberculosis; multi-drug resistance (MDR) of *MTb*(23,24); and extensively drug resistant (XDR) TB which is virtually un-treatable(25). Each of these problems complicates and worsens the TB epidemiology and response to standard anti-TB therapy. Thus, the TB situation in India is a colossal national crisis – causing misery to millions and impoverishing hundreds of thousands of families and also the nation as a whole. For a country that has declared health as human right this crisis calls for truly professional and result-oriented response. It is also a signal of demand for strengthening primary health care and for linking public health to it, instead of persisting with the present national policy of highly selective and vertical disease control, one by one, which is anachronistic in the 21st century, in the fifth largest economy in the world(26).

PPD surveys should also be systematized and institutionalized as an integral part of TB control efforts(1). *Ad hoc* surveys are better than none, but regular, periodic, local-area-specific surveys are essential to monitor incidence of *MTb* infection in all units of population. Regional data may not identify communities in which progress is slow. In addition, the analytical steps should be uniform in interpreting survey results(27-30). Even though it has been clearly demonstrated that PPD response profile in school-age children is identical whether or not they had received neonatal BCG vaccination(27,28), some investigators use differential cut off values for vaccinated and un-vaccinated children, thereby reducing the validity of survey results(19,30). Others have not used consistent criteria to compare sequential survey results over time(28,29). It is essential that the DGHS/GoI undertake the task of defining the exact protocols and modalities of PPD surveys as part of national TB control.

TB control is too complex a problem to be left to the TB experts alone. The first national TB control program was established in 1962, but after 30 years it was found to be a failure(3). Therefore, it was revised and re-launched in 1992/93(3). Directly observed treatment, short course (DOTS) was introduced in the program in 1994(3). The population under DOTS cover was increased gradually until half the nation's population was

covered by 2002 and the entire population reached coverage by March 2006(3). Thus, a truly national TB control activity has commenced only by March 2006, but using only a single modality of intervention. In public health, single intervention approach often leads to failure – except in the case of highly effective vaccines.

Primary health care and infection monitoring should be made the foundations of TB control, upon which case detection and treatment in adults and infection detection and treatment in children are to be built. In the absence of systematic and quality primary health care and disease surveillance, it will not be possible to reliably determine the time-trend of disease burden. The data available so far, since DOTS coverage was expanded widely, indicate that every year more cases are being detected and put on treatment than in the previous year(8). While this is projected as success of the programme, in that its detecting efficiency is increasing, in reality it witnesses the failure of 45 years of attempted TB control, obvious from the fact that each year more than one million new patients are put on DOTS(8).

DGHS/GoI should now re-design primary health care in rural and urban communities in order to combine quality and equity in care – so that every one gets access to comprehensive medical care for all diseases, not just a few selected by the DGHS/ GoI(26). The lack of dovetailing of public health interventions with primary care is delaying the control of not only TB but also of malaria, dysenteries, typhoid fever, cholera, Japanese encephalitis, rabies, leptospirosis and a host of other infectious diseases. The control of these 'single-etiology' diseases through public health and primary care must be the school in which practical lessons are learned to design and deploy control measures against non-communicable diseases with 'multi-factorial etiologies'.

The control of TB offers India a unique opportunity to construct a model of primary health care linked to public health.

Funding: None.
Competing interest: None stated.

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