THE COMPARISON OF TUBERCULOSIS TREATMENTS : A SHORT COURSE THERAPY AND THE DIRECTLY OBSERVED SHORT COURSE TREATMENT (DOTS), EAST JAVA PROVINCE, INDONESIA

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Abstract. Tuberculosis has been given great attention as HIV/AIDS has increased. Because HIV causes a higher tuberculosis risk is becoming more and more important better tuberculosis treatment. This study aimed to compare the smear conversion rate between short course therapy and the tuberculosis treatment with directly observed short course therapy (DOTS), in East Java, Indonesia. The average smear conversion rate in short course therapy among 35,292 cases was 94.40% over 5 year period (1989/90-1993/94). The tuberculosis treatment with DOTS was started in 1994/95. In the first 2 years the smear conversion rate were 97.67% (42/43) and 98.00%(196/200), respectively. The smear conversion rate of the treatment with DOTS was significantly higher compared to a short course therapy (p-value: <0.001). Thus, tuberculosis treatment with DOTS should be promoted. The concept of supervision by health workers or health cadres should be applied considering mostly are given by family members. And there should be readiness of tuberculosis staff to do the treatment with DOTS in all levels to expand the coverage.

INTRODUCTION

Tuberculosis (TB) is still a major cause of morbidity in the world especially in developing countries. Based on the Indonesia Household Health Surveys years of 1980 and 1986, tuberculosis was the ninth and tenth leading cause of morbidity, respectively. Among 12 countries with tuberculosis program reviews, Indonesia had the highest estimated annual rate of tuberculosis infection of 2% with an incidence of smear positive cases 105 per 100,000 population in 1990-1995. Furthermore, the tendency of HIV positivity among TB cases is increasing (Pio *et al*, 1997).

In Indonesia activities to deal with tuberculosis has been ongoing since before independence in 1945 (DOH, 1993). In 1908 the first private organization dealing with lung-tuberculosis was formed, which later changed into a social organization, the "Sociale Centrale Vereniging voor Tuberculose Bertrijiding" (SCVT). It was changed to "Balai Pengobatan Paru-Paru" (BP4) and became a unit of the Indonesian government after 1945. Since 1993 the BP4 has been under the guidance of the Directorate General of Community Health.

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In 1969 the eradication of lung-tuberculosis was integrated with village health centers, based on the first national tuberculosis workshop. The programs are providing BCG immunization to children ages 0 to 4 years old without prior tuberculin testing, diagnosing and treating smear positive tuberculosis. Furthermore, in 1979 the passive case detection was changed to active case detection.

In 1979/80 the lung-tuberculosis eradication program started to use a short course therapy, besides the standard long course therapy. In addition, at the national tuberculosis workshop 1994, an improved operational policy for the tuberculosis eradication program was formulated (based on the Indonesian government - WHO evaluation) using the short course therapy known as tuberculosis treatment with DOTS (Directorate General of CDC and ESH, 1995). The objectives of tuberculosis treatment with DOTS are to increase the smear conversion rate, to assure the regularity of treatment achieving high cure rate, and to stop the disease transmission.

The global WHO targets are 85% smear cure rate every year, 70% treated smear positive by the year 2000, and 80% smear conversion rate at the second month of tuberculosis treatment.

This study aimed to compare the smear conversion rate between a short course therapy and

the tuberculosis treatment with DOTS in East Java.

MATERIALS AND METHODS

Study area

East Java is one of the big provinces and which the capital, Surabaya, is the second largest city in Indonesia. The Province covers an area of about 48 km^2 and had a population of about 34 million in 1995. here are 37 districts in the province with an average population density of 707 people per km^2. In Surabaya the density reaches 9,857 people per km^2, while the east district (Banyuwangi) has a density of 255 people per km^2. Many industries are located in Surabaya and nearby areas, while in the other districts agriculture is the main activity. East Java had the highest number of tuberculosis cases in Indonesia. Based on health centers reports, in 1995 there were 117,762 cases (East Java Provincial Health Office, 1991-1995).

Methods

This study used results of a short course therapy in a 5 year period (1989/90-1993/94) and the tuberculosis treatment with DOTS (1994/95-1995/96) from the East Java tuberculosis eradication program (East Java Provincial Health Office 1989/90-1995/96). The treatment with DOTS was started at the third trisemester year 1994/95 in 2 districts. It was expanded to 7 districts in the following year.

Suspect tuberculosis cases include those with a persistent cough for 3 weeks, either accompanied by hemoptysis, chest pain, or dyspnea. For a short course therapy, cases are those having at least a positive result from 3 smear examinations among suspect tuberculosis patients.

The short course therapy for adult dose consists of intensive treatment by isoniasid (400 mg), vitamin B6 (10 mg), rifampicin (450 mg), and ethambutol (1,000 mg) every day for the first month; followed the intermittent treatment by isoniasid (700 mg), vitamin B6 (10 mg), and rifampicin (600 mg) twice a week for 5 months.

The tuberculosis treatent with DOTS is for those having at least 2 positive results from 3 smear examinations, among suspect tuberculosis cases having symptoms as mentioned aboved. These cases are classified in the first category. It is also for those who have been undergoing tuberculosis treatment for less than 1 month, those with smear negative but x-ray positive tuberculosis, extrapulmonal cases with poor general condition, or tuberculous meningitis. The second category is smear positive tuberculosis, including patients with failure or relapse after treatment, or those newly smear positive but who have taken anti-tuberculosis therapy for more than 1 month. The third category is for the smear negative but x-ray positive tuberculosis or extrapulmonary tuberculosis cases. Results of 3 smear examinations are negative but x-ray shows positive tuberculosis.

Those in the first category, who are still positive after treatment or are still positive after intermittent treatment are classified as failure cases. They are then referred to the second category. Those who are smear positive after being cured by the first category of treatment are classified as relapse cases.

The concept of tuberculosis treatment with DOTS involves taking antituberculosis drugs under supervision by either of the following: a village midwife, a health worker, a health cadre, depending on who lives nearest to the patient. Other supervision is given by the most influential family member, either a husband, a wife, a parent, a brother, or a sister. In East Java, the supervision is mostly given by a family member. Supervision of health staff is only for the first 3 days of taking antituberculosis drugs at the center after recruitment into the treatment with DOTS.

The following are the antituberculosis drugs used in the treatment with DOTS (adult doses in each category):

The first category consists of intensive treatment by isoniasid (300 mg), rifampicin(450 mg), pirazinamid (1,500 mg), and ethambutol (750 mg) every day for the first 2 months; followed an intermittent treatment with isoniasid (600 mg) and rifampicin (450 mg) 3 times a week for 4 months.

The second category consists of intensive treatment by isoniasid, rifampicin, pirazinamid, and ethambutol at same doses as the first category and injection of streptomycin (750 mg) every day for the first 2 months. At the third month, only oral anti-tuberculosis drugs are given (without the injection). The intermittent treatment is by isoniasid (600 mg), rifampicin (450 mg), and ethambutol (1,250 mg) 3 times a week for 5 months.

The third category consists of intensive treatment by isoniasid, rifampicin, pirazinamid, and injection of streptomycin at the same doses as the sec-

ond category every day in the first 2 months. The intermittent treatment is by isoniasid and rifampicin at the same doses as the first category 3 times a week for 4 months.

A smear conversion is examined after the intensive treatment. A short course therapy only examines a smear conversion after the intensive treatment. The treatment with DOTS also examines another conversion after the intermittent treatment. Two negative smear conversions after the intensive and intermittent treatments determine a "cure".

Data analysis

The difference of tuberculosis treatments was analyzed by comparing the percentage of smear conversion rate between treatments using the z-test.

RESULTS

Table 1 shows that smear positive tuberculosis had increased. The prevalence of smear positive tuberculosis is at most 0.07%. Clinical tuberculosis also showed an increasing trend (East Java Provincial Health Office, 1991-1995). Table 2 shows the average smear conversion rate of cured cases with short course therapy to be 94.40%. Drop-out cases and treatment failures were less than 2% (East Java Provincial Health Office, 1989/90-1993/94).

Table 1
The total smear positive and clinical tuberculosis, East Java, 1991-1995.

Year	Smear positive	Prevalence* (%)	Clinical tuberculosis	Prevalence* (%)
1991	21,478	0.065	38,625	0.12
1992	4,751	0.014	21,391	0.064
1993	22,189	0.065	104,762	0.30
1994	23,416	0.069	91,312	0.27
1995	24,026	0.070	94,279	0.28

* Based on the projected population from the census 1990.

Table 2
Results of a short course therapy, East Java, 1989/90-1993/94.

Year	Smear positive	Cured (%)	Drop out (%)	Failure (%)
1989/90	3,395	3,296 (97.08)	84 (2.47)	15 (0.44)
1990/91	5,608	5,535 (98.69)	70 (1.25)	8 (0.14)
1991/92	9,233	9,187 (99.50)	37 (0.40)	11 (0.12)
1992/93	6,212	6,147 (98.95)	55 (0.89)	10 (0.16)
1993/94[a]	10,844	9,151 (84.39)	213 (1.96)	24 (0.29)
Total	35,292	33,292 (94.40)	459 (1.30)	68 (0.19)

[a]No complete data.

Table 3
Results of tuberculosis treatment with DOTS, East Java, 1994/95-1995/96.

Year	Smear positive New / relapse	Average conversion (%)	Reason[a]	Smear negative x-ray positive
1994/95	42# / 1	97.67	# 1 case	12
1995/96	194##/ 6###	98.00	## 3 cases ### 1 case	8
Total	236/ 7	97.94		20

[a]transfer to another cily.

Table 3 shows that the average smear conversion rates for new and relapse cases of the treatment with DOTS were 97.67 % (42/43) and 98.00% (196/200), respectively for the first two years. In the first year, one patient could not be examined because he has transferred to another district. In the second year, 4 cases could not be examined for the same reason. For the first 2 years all smear negative but x-ray positive tuberculosis cases were treated, 12 and 8 cases, respectively. The cure rate was the same as the conversion rate of 97.67%(42/43) in the first year.

The statistical analysis to determine the difference of smear conversion rates between treatments is as follows: let p be the rate for tuberculosis treatment with DOTS and q the rate for a short course therapy. And the standard error (SE) of p-q is SE = square root [p (1-p) / n + q (1-q) / m], where n is the sample size for the DOTS and m sample size for the short therapy. The values are p=0.9794, n=243 for DOTS and q=0.9440, m=35,292 for a short course therapy. Then Z = (p-q)/SE = 0.0354/0.00928 = 3.84.

This is highly significant on the standard normal scale (p-value <0.001).

DISCUSSION

Indonesia is still facing the problem of tuberculosis, although the eradication activities have been ongoing since before independence. Moreover, the tuberculosis cases have been tending to increase (DOH, 1999).

The East Java health profile 1991-1995 showed the percentages of smear positive tuberculosis were ranged 5.7% to 9.5%. Hence among 94,279 clinical tuberculosis cases, there would be about 5,373 to 8,956 smear positive cases (1 smear positive tuberculosis per 1,000 population). This is below the target of the national tuberculosis prevalence of 0.24%. One of the reasons is because there have not been uniform tuberculosis reporting and recording systems in all health facilities, either in public or in private services. Furthermore, many clinical tuberculosis cases are not yet being examined, as only 50% of total centers are supported by the tuberculosis program. This is because of the high cost of tuberculosis treatment.

The smear conversion rate of treatment with DOTS was significantly higher when compared to a short course therapy (p-value <0.01). The treatment with DOTS minimizes drop-outs and defaulters because of supervision in taking the antituberculosis drugs. Besides, it determines the cure rate so that failure cases are promptly treated. Hence the tuberculosis treatment with DOTS is more effective in reducing disease transmission. Moreover, it consists of multiple drugs which lessens the drug resistant problem.

However, the results of treatment with DOTS, including the cure rate, are only available for a small number of cases treated in the first year. The concept of supervision by health workers or cadres should be applied, considering that to date this is mostly given by family members. There should be readiness of tuberculosis staff at all levels (provincial, district, and health center) to conduct the DOTS to expand its coverage to all subdistricts in the province. In China, the directly observed short-course chemotherapy increased the coverage to 574 million people over a 4 year period. It treated 112,842 smear positive tuberculosis cases with an average 3 months sputum conversion of 91.5% (China Tuberculosis Control Program, 1996).

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