

# Compliance with antituberculosis drugs among tuberculosis patients in Alexandria, Egypt

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الالتزام بالأدوية المضادة للتدرن بين مرضى السلّ ( التدرن ) بالإسكندرية ، مصر  
عشري جاد محمد وأحمد محمد أمين مندبل وعائدة علي رضا شريف وزهيرة متولي جاد وسنى عبده سلام  
خلاصة : السلّ ( التدرن ) واحد من الأمراض المهمة المنبثقة من مرقدها ، وتنجم عنه أعداد متزايدة من  
المراضة والوفيات على الصعيد العالمي . ومن معوقات مكافحة التدرن عدم التزام المرضى بالمقررات  
العلاجية . ولدراسة مدى الالتزام بمقررات الأدوية المضادة للتدرن ، تم اسقضاء 172 حالة تدرن شخصت  
خلال الشهور الثلاثة الأولى من عام 1995 . فأجريت مقابلات مع المرضى في منازلهم خلال شهري تموز /  
يوليو وآب / أغسطس 1995 . وتبين أن أكثر من ثلث المرضى (34.9%) لم يكونوا ملتزمين بتناول أدوية  
التدرن المقررة . كذلك وجد أن من بين العوامل المؤدية إلى زيادة الالتزام بالمقرر العلاجي : أعراض المرض ،  
والمعرفة بمعلومات عنه ، وسبق الإصابة بالتدرن بين أفراد العائلة ، والمعالجة داخل المستشفى . وانتهت  
الدراسة إلى ضرورة تزويد المرضى في وقت التشخيص وبدء المعالجة بمزيد من المعلومات عن المرض وأهمية  
الالتزام بالمقرر العلاجي ، بالإضافة إلى أهمية إشراف مسؤولي الرعاية الصحية على تناول المرضى للأدوية .

**ABSTRACT** Tuberculosis is an important reemerging disease with increasing global morbidity and mortality. Tuberculosis control is hindered by patient noncompliance with treatment regimens. To study compliance to antituberculosis drug regimens, 172 patients diagnosed with tuberculosis during the first three months of 1995 were investigated. The patients were interviewed at their homes during July and August 1995. More than one-third (34.9%) of the patients were not adhering to the antituberculosis drug regimen. Factors increasing drug compliance included: disease symptoms, knowledge about the disease, family history of tuberculosis and hospitalization. More information about the disease and the importance of compliance should be provided to tuberculosis patients at the time of diagnosis and initiation of therapy. Supervision of drug administration by health care personnel is stressed.

## L'observance thérapeutique chez les tuberculeux à Alexandrie (Egypte)

**RESUME** La tuberculose est une maladie réémergente importante dont la morbidité et la mortalité au niveau mondial augmentent. La lutte antituberculeuse est entravée par le fait que les patients ne respectent pas les schémas thérapeutiques. Pour étudier l'observance des schémas thérapeutiques, on a examiné 172 patients chez lesquels la tuberculose a été diagnostiquée pendant les trois premiers mois de 1995. Les patients ont été interviewés à leur domicile au cours des mois de juillet et août 1995. Plus d'un tiers d'entre eux (34,9%) ne respectaient pas le schéma thérapeutique. Parmi les facteurs qui augmentent l'observance thérapeutique, on trouvait: les symptômes de la maladie, les connaissances relatives à la maladie, les antécédents de tuberculose dans la famille et l'hospitalisation. Davantage d'informations relatives à la maladie et à l'importance de l'observance thérapeutique devraient être fournies aux tuberculeux au moment du diagnostic et de la mise en route du traitement. L'accent est mis sur la surveillance de l'administration du traitement par le personnel soignant.

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## Introduction

Tuberculosis (TB) is today considered the most important resurgent disease worldwide. It has the highest morbidity and mortality rate compared to any other single pathogen. It is estimated that one third of the world's population is infected with *Mycobacterium tuberculosis*. About eight million people contract TB annually, mostly (95%) from developing countries [1]. More than three million deaths are attributed to TB every year; one million of which are women and about 170 000 children. It is also considered the most frequent cause of death among people with acquired immunodeficiency syndrome (AIDS) [2].

Antituberculosis chemotherapy should be administered to the greatest possible number of patients in order to cure them, and thereby interrupt the chain of transmission of TB within the population [3]. The most serious problem hindering TB treatment and control is noncompliance of patients. It is believed to delay sputum conversion to smear negative, increase the relapse rates 5–6 times, and help the emergence of resistant mutant strains [4,5].

Adherence to treatment requires the active participation of the patient in self-management of treatment and cooperation between the patient and the health care provider. The reasons for poor adherence are multifaceted and complex, but include the characteristics of the individual patient and social and economic factors such as the availability of drugs, communication between the patient and health care providers, duration and number of medications needed, side effects, cost of treatment, competing demands on time, contradictory norms or expectations of families and cultural groups, and the poor quality of the TB control infrastructure [6].

The present study was conducted to determine the rate of adherence to antituberculosis drugs among TB patients in Alexandria, and to study some epidemiological factors associated with it.

## Subjects and methods

All patients prescribed antituberculosis therapy during January–March 1995 were identified from records kept in the six chest dispensaries of Alexandria (El-Maamora, Bacous, Moharrem Bey, El-Gomrok, Al-Kabbary and Kom El Shokafa). Addresses of these patients were obtained from their records.

In Alexandria, all smear-positive cases are hospitalized until they become smear-negative. During hospitalization, they receive rifampicin 600 mg, isoniazid 300 mg, pyrazinamide 30 mg/kg per day and streptomycin 15 mg/kg per day. On discharge, they receive ethambutol 40 mg/kg three times weekly and isoniazid 300 mg daily for 8 months. Smear-negative cases and those who refuse hospitalization receive ethambutol and isoniazid for 12 months with streptomycin for the first 2 months [7].

The research team visited these patients at home during July and August 1995; a predesigned questionnaire was completed using a patient self-report method [6]. The questionnaire was composed of the following sections: a) demographic characteristics of the patient, e.g. age, sex, work and education; b) symptoms and diagnosis of tuberculosis and knowledge of the course of tuberculosis, modes of transmission, and its complications; and c) adherence, where the patient was asked about drugs taken, how taken, number of tablets (dose), regularity, side effects and improvement in

Table 1 Demographic characteristics of the patients and compliance with antituberculosis treatment

Variable	Compliance				Total		$\chi^2$
	Compliant		Noncompliant		No.	%	
	No.	%	No.	%	No.	%	
<b>Age (years)</b>							
< 20	12	10.7	8	13.3	20	11.6	7.78
20–	28	25.0	12	20.0	40	23.3	
30–	24	21.4	12	20.0	36	20.9	
40–	27	24.1	8	13.3	35	20.3	
50–	5	4.5	8	13.3	13	7.6	
≥ 60	16	14.3	12	20.0	28	16.3	
<b>Sex</b>							
Male	80	71.4	44	73.3	124	72.1	0.07
Female	32	28.6	16	26.7	48	27.9	
<b>Work</b>							
Manual	24	21.4	20	33.3	44	25.6	6.01
Skilled	29	25.9	7	11.7	36	20.9	
Professional	13	11.6	7	11.7	20	11.6	
Housewife	29	25.9	16	26.7	45	26.2	
Other	17	15.2	10	16.7	27	15.7	
<b>Education</b>							
Illiterate or RR <sup>a</sup>	60	53.6	28	46.7	88	51.2	4.65
Primary or preparatory	28	25.0	24	40.0	52	30.2	
Secondary or higher	24	21.4	8	13.3	32	18.6	
Total	112	65.1	60	34.9	172	100	–

<sup>a</sup> RR = read and write

symptoms of TB. The patients were considered noncompliant if they did not take the medication as prescribed by the treating physician.

Analysis was carried out using SPSS statistical software [8]. Crude odds ratio was computed to test the bivariate association for binary variables. Multivariate logistic regression was performed to obtain the adjusted estimates of the effect on compliance of all variables found significantly associated in bivariate analysis [9].

## Results

The number of newly diagnosed TB cases recorded at the six dispensaries during the study period was 184. Addresses of five patients could not be found, seven patients were lost due to lack of cooperation or travelling and 172 were interviewed.

Table 1 shows that about two-thirds of males (64.5%) and females (66.7%) complied with their antituberculosis regimens, giving an overall compliance rate of 65.1%. As regards age distribution, 20 patients (11.63%) were under the age of 20

Table 2 Crude analysis of association of compliance with variables studied

Variable	Compliance				Odds ratio
	Compliant		Noncompliant		
	No.	%	No.	%	
<b>Symptoms</b>					
Anorexia	92	63.4	53	36.6	0.61
Cough	83	74.6	28	25.2	3.27 <sup>a</sup>
Haemoptysis	54	74.0	19	26.0	2.01 <sup>a</sup>
Sweating	100	69.4	44	30.6	3.03 <sup>a</sup>
Enlarged lymph nodes	16	72.7	6	27.3	1.50
Existence of other diseases	80	62.5	48	37.5	0.63
Initial hospitalization	80	80.0	20	20.0	6.00 <sup>a</sup>
Instructions from health care providers	88	71.0	36	29.0	2.44 <sup>a</sup>
Knowledge about TB	100	71.4	40	28.6	4.17 <sup>a</sup>
Initial improvement in symptoms	96	68.6	44	31.4	2.18 <sup>a</sup>
Family history of TB	43	81.1	10	18.9	3.12 <sup>a</sup>

<sup>a</sup> Significant at 95% confidence level

years. More than three-fifths of the sample were above 20, but less than 50 years of age. Chi-squared distribution showed no association between age of the patient and compliance ( $\chi^2 = 7.78$ ;  $P > 0.05$ ).

With regard to the work of the patients, 44 (25.6%) were manual workers, 36 (20.9%) were skilled workers, while 45 females out of 48 were housewives. Again, work was not found to be statistically associated with compliance ( $\chi^2 = 6.01$ ;  $P > 0.05$ ).

More than half of the patients were either illiterate or could just read and write. Graduates from secondary schools or university constituted only 18.6% of the sample. Education was not found to be statistically associated with compliance ( $\chi^2 = 4.65$ ,  $P > 0.05$ ).

Table 2 shows the crude analysis of the variables studied with compliance to anti-tuberculosis drug regimens. As regards the presenting symptoms of TB, patients with

cough and night sweating were more likely to comply with treatment (odds ratio [OR] = 3.27 and 3.03 respectively). Those who presented with anorexia were less likely to comply (OR = 0.61). Presence of other associated diseases, e.g. diabetes, decreased compliance (OR = 0.63;  $P > 0.05$ ). Patients hospitalized at the start of treatment, patients who received instructions about the use and importance of the drugs from drug providers, patients with good knowledge about TB, and patients who reported a positive family history of TB were found to have been more compliant.

All factors found to be significantly associated with compliance in the crude analysis were subjected to multivariate logistic regression as shown in Table 3. Knowledge about TB, hospitalization, family history, and cough as a presenting symptom were all associated with increased compliance (OR = 8.87, 4.85, 3.19 and 2.44 respective-

Table 3 Adjusted odds ratio for factors found to influence compliance in bivariate analysis

Factor	Comparison	Odds ratio	Confidence interval
Knowledge about TB	Good versus poor	8.87 <sup>a</sup>	2.74–28.89
Hospitalization	Initial hospitalization versus home treatment	4.851 <sup>a</sup>	2.23–10.55
Family history	Positive versus negative	3.103 <sup>a</sup>	1.24–8.24
Cough	Cough versus other symptoms	2.446 <sup>a</sup>	1.10–5.44
Associated diseases	Present versus absent	0.207 <sup>a</sup>	0.07–0.6

<sup>a</sup> Significant at 95% confidence level

ly) while the presence of other associated diseases decreased compliance (OR = 0.2).

## Discussion

In developing countries, compliance with antituberculosis chemotherapy poses specific problems because of the epidemiological and socioeconomic context in which it occurs [3]. Physicians cannot accurately identify noncompliant patients, and it has been reported that patients commonly conceal this behaviour from their physician [10]. Therefore, members of the study team had to collect the data themselves.

The present study shows that 65.1% of the sample studied of TB patients were compliant with the prescribed regimen. About one-third of the patients were non-compliant, which may result in treatment failure. This figure is in line with that reported by Mousa et al. who found that 41% of smear-positive TB patients in Alexandria in 1993 were noncompliant [11]. In China, TB treatment was completed by 73.1% of patients within 9 months, while 26.9% failed to complete their regimen [12].

Studies on the association of demographic characteristics of patients with adherence to antituberculosis medication give inconsistent results [6]. The present work revealed that these factors (age, sex, work and education) were not associated significantly with adherence. The relationship between family income and adherence could not be investigated as most patients concealed their income.

The present study reveals that compliance with antituberculosis therapy was significantly higher among those who had good knowledge about TB (OR = 8.57). It has also been documented that when patients know about the natural history of TB, its complications and the importance of complying with drug therapy, their adherence to the prescribed regimen is improved [13]. In a similar study in India in 1992, the authors found that there was an association between the compliance behaviour of patients and their knowledge of specific aspects of the disease [14]. Patients who perceive their illness to be more serious and who believe that treatment will alleviate the condition are more likely to be compliant [15].

Features of the disease are potential determinants of compliance. Patients with ac-

tive disease and those with symptoms are more compliant [16]. The present study revealed that patients who experienced more cough, haemoptysis and sweating generally complied more to the treatment (OR = 3.72, 201, 3.03 respectively). These patients may have been more convinced of severity of their disease. However, on controlling other variables studied, which may act as confounders or effect modifiers, only cough remained as a predictor (OR = 2.446). Generally, patients with symptoms usually recognize the severity of TB and have a higher chance of compliance [11,17].

Tuberculosis patients with other associated chronic diseases, e.g. diabetes or ischaemic heart disease, who receive other drugs on a daily basis, were less likely to comply with antituberculosis treatment. This may be attributed to the complexity of compliance with too many drugs, especial-

ly for less-educated people, in addition to the increased cost. In contrast to the present findings, Wong reported that associated diseases did not contribute to noncompliance in his study [18].

## Recommendations

To increase the compliance rate among TB patients, more information about TB must be given to them at the time of diagnosis through health education sessions; these should be appropriate to the educational level and cultural beliefs of the patient. More detailed instructions about the importance and effectiveness of drug treatment of TB must also be provided by the health care personnel. Once TB is diagnosed and therapy is initiated, hospitalization of all patients should be encouraged.

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