ASSESSMENT AND ENHANCING ADHERENCE TO TREATMENT REGIMEN IN TUBERCULOSIS OUT PATIENTS

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ABSTRACT

Objectives: The objectives of the study were to describe the pattern and monitoring the medication compliance of anti-tubercular used in patients and to assess the knowledge among patients regarding their medications.

Methods: During the 7 months prospective study, a suitably designed patient data collection form was prepared in consultation with the physician and clinical pharmacist, also referring standard textbooks and journals, which include information of patient demographics details such as age, gender, education, duration of disease, and medications history.

Results were analyzed by using Wilcoxon signed-ranks test.

Key findings: Among the 39 patients who completed the 2 months follow up study, there was statistically significant increase in medication adherence score from baseline.

Baseline with first follow up revealed a mean increase in medication adherence level of 1.718 ± 0.759 and (p < 0.0001) which is statistically significant.

Baseline to second follow up show a mean increase of 2.435 ± 0.852 and (p < 0.0001) which is statistically significant.

The major reasons to stop medication were as follows: 23(58.97%) patients said that they stopped/miss the medication because of forgetfulness, 12(30.77%) patients stopped/miss medication because high cost of medications, 20(51.28%) patients stop/miss medication because Lack of access to hospital/drug store.

Conclusions: The finding of this study may suggest that a well-structured tuberculosis patient counseling by pharmacist result in better medication adherence which may indirectly result in better clinical outcome.

Keywords: Compliance, Medication adherence, Patient counseling, Assessment.

INTRODUCTION

Medication adherence is defined as "the extent to which a person's behavior (in terms of taking medications, following diets, or executing lifestyle changes) coincides with medical or health advice." The term "adherence" assumes collaboration between the patient and the health care provider regarding the patient's health care and health-related decisions. Although "adherence" is generally recognized in the medical community, "compliance" has more frequently been used. Patient compliance is not synonymous with adherence. Compliance may suggest a passive approach to health care on the part of the patient. This paternalistic view of the patient may not encourage the patient to take an active role in his or her health care and may limit the responsibility the health care practitioner accepts for a less than optimal outcome.[1]

Assessment is defined as a process of gathering and documenting information about the achievement, skills, abilities, and personality variables of an individual. Assessment is used in both an educational and psychological setting by teachers, psychologists, and counselors to accomplish a range of objectives. These include the following:

- To learn more about the competencies and deficiencies of the individual being tested.

- To identify specific problem areas and/or needs.

- To evaluate the individual's performance in relation to others.

- To evaluate the individual's performance in relation to a set of standards or goals.

- To evaluate the impact of psychological or neurological abnormalities on learning and behavior.

- To predict an individual's aptitudes or future capabilities.[2]

People who are prescribed self-administered medications typically take less than half the prescribed doses. Efforts to assist patient with adherence to medications might improve the benefits of prescribed medications, but also might increase their adverse effects.[3]

Tuberculosis treatment is difficult and requires long courses of multiple antibiotics. Contacts are also screened and treated if necessary. Antibiotic resistance is a growing problem in (extensively) multi-drug-resistant tuberculosis. Prevention relies on screening programs and vaccination, usually with Bacillus Calmette-Guérin (BCG vaccine).[5]

The microbiologic principles of antituberculosis therapy have been recently reviewed. The first-line drugs are Isoniazid, Rifampin, Pyrazinamide, and Ethambutol. The usual daily dosages for adults are 300 mg of Isoniazid, 600 mg of Rifampin, 15 to 30 mg/kg (maximum 2 g) of Pyrazinamide, and 15 to 25 mg/kg (maximum 2.5 g) of Ethambutol. Hepatotoxicity is the major adverse effect of Isoniazid, Rifampin, and Pyrazinamide; optic neuritis can result from Ethambutol at dosages of 25 mg/kg per day. Second-line antituberculosis drugs are Streptomycin, Kanamycin, Capreomycin, Ethionamide, Cycloserine, Ofloxacin and Ciprofloxacin.[6]

Treatment using more than one drug is based on two principles: preventing acquired drug resistance and enhancing efficacy. Tubercle bacilli undergo random chromosomal mutations that have made them resistant to every drug used to treat tuberculosis. Fortunately, these mutations are infrequent because they are unlinked (in terms of chromosomal location or function) and specific to a drug or drug class, spontaneous generation of an organism with multi-resistance is extremely improbable. Acquired drug resistance for tuberculosis is almost always caused by inadequate treatment. This can include failure of the patient to take the prescribed drugs, failure of the physician to prescribe appropriately, failure of the healthcare system to ensure that drugs are available, or rarely

malabsorption of the drug(s) due to dysfunction of the digestive system or substandard bioavailability of the preparation.[7] About half (50%) of the medicines prescribed for people with chronic conditions are not taken. This is assumed to have large personal, economic, and societal costs, but are patients really any worse off for not taking their medicines as prescribed? Doctors say that not taking drugs means poorer health outcomes, but patients argue that only they can know what works for them and what doesn't. Bridging the gap between the agendas of patients and doctors changed the emphasis from the authoritarian concept of compliance to the more inclusive concept of concordance. Concordance means shared decision making and arriving at an agreement that respects the wishes and beliefs of the patient. What it should not be is a more gift wrapped version of compliance.[9]

In tuberculosis different classes of drugs are often used in combination, and in regimens requiring multiple daily doses of each agent. The resulting dosage schedules are often extremely complex. It has been considered that complex treatment regimens should result in poor compliance.

MATERIALS AND METHODS

Study Setting

The study was carried out at out patient Department of Respiratory medicine among patients diagnosed to have tuberculosis at KLES Hospital and Medical Research Centre, which is 1800 bed tertiary care hospital.

Study design

It was a prospective type of study in which patients receiving treatment for tuberculosis at Respiratory department were studied for assessment of medication adherence.

Study Period

It was a prospective type of study initiated from June 2008 to Jan 2009.

Study criteria

The enrollment of patient was done as per the inclusion and exclusion criteria stated in study protocol as follows. The subjects were selected on the basis of inclusion & exclusion criteria. The inclusion criteria are

Patients diagnosed and undergoing tuberculosis treatment, Patients age above 18 years of both the genders. The inclusion criteria are

Patients having asthma, bacterial or viral infection, hepatic or psychiatric disorders, Patients above 65 years will be excluded from the study.

Source of data

Patient data collection form, hospital and medical records and laboratory reports of tuberculosis patients.

Ethical clearance

The study was approved by Jawaharlal Nehru Medical College institutional ethics committee on human subject research and issued ethical clearance certificate.

Informed consent

Informed consent was taken prior to enrollment of patients for study. A patient informed consent form was prepared using the guidelines given by RGUHS and as per ethical guidelines containing the description of the study and it was used to take the consent of the patient to participate in the study.

Study materials

The following study material was used for the study:

- Patient data collection form.
- Morisky's adherence questionnaires.
- Patient information leaflets.
- Patient informed consent.

Study procedure

After obtaining the approvals from the ethical committee and from the Respiratory department, the study was initiated at Respiratory department by the enrollment of the patients based on inclusion and exclusion criteria of the study.

The patients were briefed about the study and consent form was given to sign in as the participant for the study. A suitably designed patient data collection form was prepared in consultation with the physician and clinical pharmacist, also referring standard textbooks and journals, which include information of patient demographics details such as age, gender, education, duration of disease and medication history.

Patient interview

Baseline data regarding patient medication and adherence level to treatment regimen were obtained by structured interview (Administering Morisky adherence questionnaires to the patients) to assess their adherence level. Based on their Morisky adherence score they were counseled and interviewed to understand factors responsible for non-adherence to treatment regimen and were educated regarding their disease and medications. PILs prepared in English and vernacular languages (Marathi, Kannada) were distributed to tuberculosis patients as written educational materials. Patient's medical and medication history was collected by referring his/her medical and medication records for the counseling of patients on their medications. Various resources like Micromedex, American Pharmacist Handbook also used.

At the two follow up visits one month each, the patient was finally assessed for medication adherence.

Statistical Analysis

The statistical analysis was done by using Wilcoxon signed-ranks test.

RESULTS

During the seven month study period, total of 44 tuberculosis patients were enrolled as per the inclusion and exclusion criteria.

Total 39 tuberculosis patients completed the study; the remaining five patients did not turn for the follow up due to unknown reasons. Those who have completed the study were included in the analysis. A total of 39 patients were diagnosed as tuberculosis.

Baseline demographic characteristics of enrolled Tuberculosis patients:

Gender

Amongst enrolled Tuberculosis patients, male patients 22(56.41%) were more compared to female patients 17(43.58%). (Table 1)

Table 1: Gender details of enrolled patients (n=39):

Gender	No. of Patients	Percentage (%)
Male	22	56.41%
Female	17	43.58%

Age

The age distribution of enrolled patients is as follows: 12(30.76%) of tuberculosis patients were between the age group of 18-35 years of age; 7(17.95%) were between the age group of 36 to 45 years of age; 9 (23.07%) were between the age group of 46 to 55 years of age; 11 (28.21%) were between the age group of 56 to 65 years of age. (Table 2, Fig 1)

Table 2: Age group details of enrolled patients (n=39):

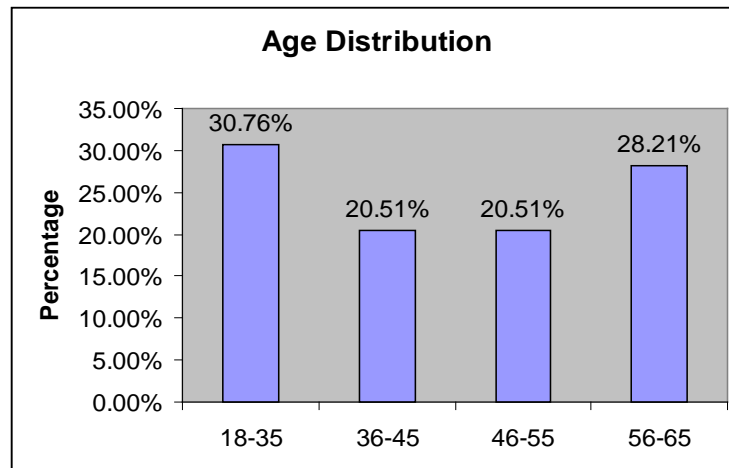| Age group (years)	No. of Patients	Percentage (%)
18-35	12	30.76%
36-45	08	20.51%
46-55	08	20.51%
56-65	11	28.21%

Fig. 1: Age distribution of enrolled patients

Education Background

Among the participant of the study, 8 (20.51%) of the patients were having formal education and were graduates; 7 (17.95%) had a formal education up to PUC level; 11 (28.21%) were having education between first to 10th standard and 13 (33.33%) patients were illiterate patients who have not received any formal education. (Table 3, Fig 2)

Occupation

Among the enrolled tuberculosis patients most of the patients were housewife 15(38.46%) followed by businessman 10(25.65%); employed patients were 6(15.38%); in agriculture 4(10.25%); Remaining patients were doing some other works 4(10.25%). (Table 4, Fig 3)

Life Style Habits (Alcohol and Smoking)

It was found that 13(33.33%) were alcoholic and 26(66.66%) were non-alcoholic. Among 39 patients 19(48.71%) were smokers; 4(10.25%) were past smokers; 16(41.03%) were non-smokers. (Fig 4)

Duration of disease

Among the participant of the study, 12(30.76%) of the patients were having the history of tuberculosis for last 1 to 5 months; 16(41.03%) patients were having the history of tuberculosis for last 6 to 10 months; Remaining 11(28.21%) patients were having the history of tuberculosis for last ≥11 months. (Table 5, Fig 5)

Patient Medication History

Majority of patients 16(41.02%) were on combination therapy (two antitubercular drugs); 10(25.62%) were on three antitubercular drugs; remaining 13(33.33%) were on multiple drug therapy (four antitubercular drugs)

Assessment of Medication Adherence

Morisky Medication Adherence Scale (MAS) Score

All the 39 participants of the study were initially provided MAS questionnaires at the time of enrollment and subsequent follow up, medication adherence score was evaluated at baseline, first and second follow up. The baseline data was compared with first and second follow up by using Wilcoxon signed-ranks test.

Baseline with first follow up revealed a mean increase in medication adherence level of 1.718 ± 0.759 and (P < 0.0001) which is statistically significant.

Baselines with second follow up show a mean increase of 2.435 ± 0.852 and (P < 0.0001) which is statistically significant. (Table 6, Fig 6)

Table 3: Education details of enrolled patients (n=39):

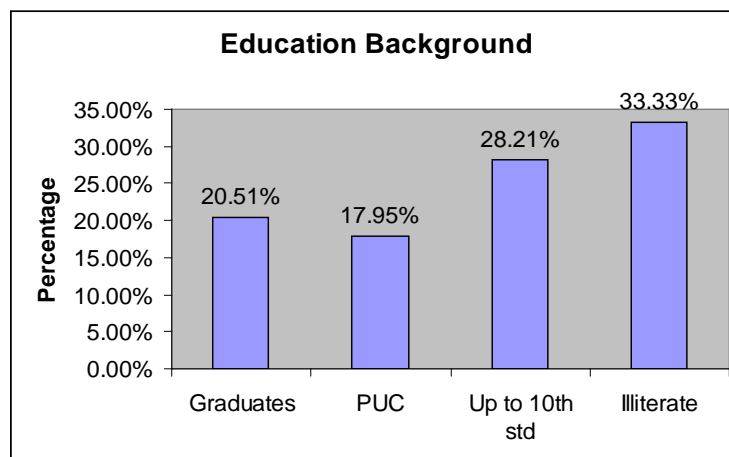| Education	No. of Patients	Percentage (%)
Graduates	8	20.51%
PUC	7	17.95%
Up to 10th std	11	28.21%
Illiterate	13	33.33%

Fig. 2: Education Background

Table 4: Occupational details of enrolled patients (n=39)

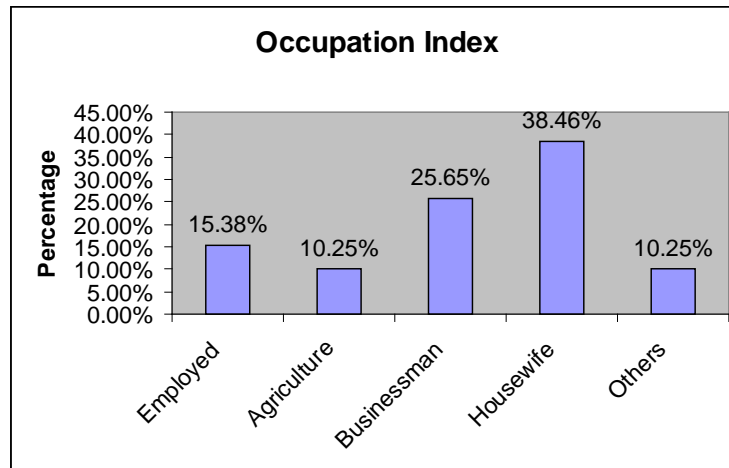| Occupation	No. of Patients	Percentage (%)
Employed	6	15.38%
Agriculture	4	10.25%
Businessman	10	25.65%
Housewife	15	38.46%
Others	4	10.25%

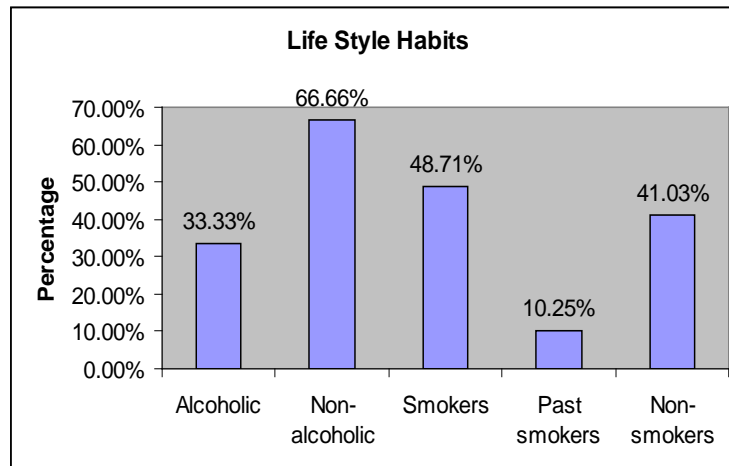**Fig. 3: Occupational details of enrolled patients**

Fig. 4: Life Style Habits (Alcohol and Smoking)

Table 5: Duration of Disease (in months)

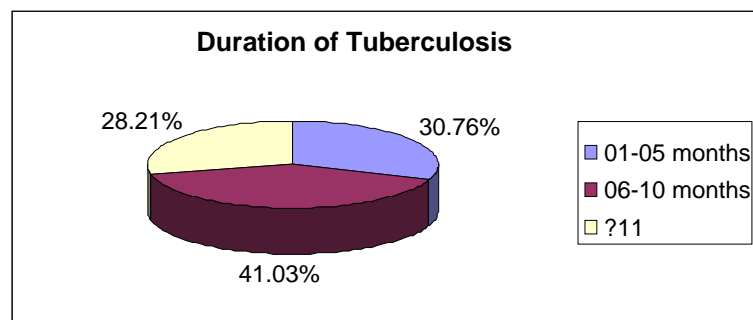| Duration of disease (months)	No. of Patients	Percentage (%)
01-05	12	30.76%
06-10	16	41.03%
≥11	11	28.21%

Fig. 5: Duration of Disease (in months)

Table 6: Morisky Medication Adherence Score (MAS)

a)   Baseline adherence score to first follow up score

Average Baseline	Average Follow up Ist	Mean SD	P-Value
2.25	3.97	1.718 ± 0.759	P<0.0001

b)   Baseline adherence score to second follow up score

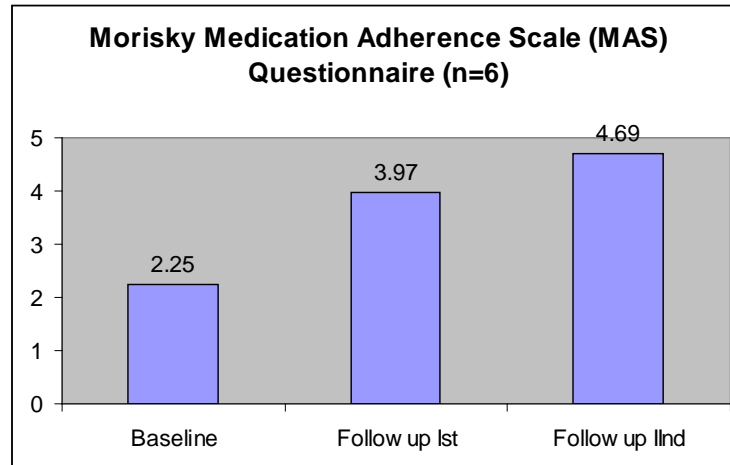| Average Baseline	Average Follow up IInd	Mean SD	P-Value
2.25	4.69	2.435 ± 0.852	P<0.0001

Fig. 6: Morisky Medication Adherence Score (MAS)

Overall medication adherence improvement was compared with various demographic factors like gender, age, diagnosis, duration of disease and education level by using Wilcoxon signed-ranks test.

Self-reported reasons to stop/miss medications

Out of 39 enrolled Tuberculosis patients, 23(58.97%) patients said that they stopped/miss the medication because of forgetfulness, 12(30.77%) patients stopped/miss medication because high cost of medications, 20(51.28%) patients stop/miss medication because

Lack of access to hospital/drug store, 14(35.9%) patients stopped/miss medications because they were having fear of side effects. Other reasons like Confused over schedule and decided not to dose -15 (38.46%), Lack of information about how to take/Illiteracy -12 (30.77%), Believed medication was not effective and decided not to dose -14 (35.9%), Absorbed in daily work and forget to take/Occupation related problems -16(41.03%), Lack of family support/Motivation 18(46.15%) and Fear of becoming dependent on treatment -17(43.59%).

Table 7: Self-reported Reasons to Stop/Miss Medications

Reasons	No. Of Patients (n=39)	Percentage (%)
Forgetfulness	23	58.97
High cost of medications	12	30.77
Lack of access to hospital/drug store	20	51.28
Fear of side effects	14	35.9
Confused over schedule and decided not to take dose	15	38.46
Lack of information about how to take/Illiteracy	12	30.77
Believed medication was not effective and decided not to take dose	14	35.9
Absorbed in daily work and forget to take/Occupation related problems	16	41.03
Lack of family support/Motivation	18	46.15
Fear of becoming dependent on treatment	17	43.59

DISCUSSION

Medication adherence in tuberculosis patients at KLES Hospital has not been assessed previously. Thus, this study was designed to assess the effectiveness of patient counseling by clinical pharmacist on tuberculosis patient's medication adherence.

Determination of compliance by self-assessment and pill count method are the tool available for assessing compliance in developing countries like India, So in the study self-assessment method and pill count method was used to assess medication compliance in tuberculosis patients which is economic, simple, easy to perform, and may provide additional information about the patients attitudes towards the illness and medication use.

During the interview, patients were assessed for medication adherence. The individualized patient education program was tailored to patients needs. The finding showed a significant increase in medication adherence among tuberculosis patients at two month follow up in most of the responses. Generally in Indian hospitals, patients are not receiving counseling regarding their medications and disease and therefore preliminary initiative study was taken up and the study results shows counseling sessions was able to produce a statistically significant results.

Non-compliance in this study is defined as "The extent to which a person's behavior (in terms of taking medications, following diets, or executing lifestyle changes) coincides with medical or health advice."[1]

The adherence rate for medical treatments averages about 50%, with a range that extends from 0% to 100% (and even above 100%, in the case of patients who use more than the prescribed amount). Moreover, these figures leave out the high percentage of patients who fail to seek medical attention when they could benefit from it or who drop out of medical care after being prescribed a course of treatment.[4]

Low rates of compliance with medication pose a major challenge to the effective management of most chronic diseases, including tuberculosis. The reasons for non-compliance are many and varied, and include factors such as complexity of the treatment regimen, administration route, patient beliefs about therapy and other psychological factors.[8]

In this study, patients had a significant improvement in self-reported compliance to the medications. These results manifest the need for pharmacist-mediated counseling regarding the disease and medications of tuberculosis patients

Well structured interviews are needed to improve the medication adherence and it will improve indirectly clinical outcomes in chronic illness like tuberculosis. Increased knowledge regarding disease and medications might have led to the positive impact on medication adherence.

Various study conducted on medication adherence was mainly focused on assessment of adherence by using various demographic characteristics like age, gender, diagnosis, duration of disease etc.

In this study, comparison for medication adherence improvement was done by using various demographic factors like age, gender, diagnosis, duration of disease, education, occupation and patient medication history. The study shows significant difference at first follow up scores between male and female (P=0.027) and various age groups (P=0.023), this may be due to significant difference in baseline scores in male and female patients and in various age groups. Other factors showed no significant difference in improvement of adherence score. This fact reveals that, counseling shows equal impact on all these factors.

During the time of baseline assessment we asked the reasons to stop/miss medications to the patients. Following were the reasons:

High cost of the medication 12(30.77%) was one of the reported reason for medication non-adherence. Some of enrolled patients were farmers and from low economic groups. They couldn't afford the cost of medications.

Another frequently reported reason for non-adherence was forgetfulness 23(58.97%). This problem was resolved by using the tools like medication reminder or diary keeping.

Lack of access to hospital or drug store 20(51.28%) was another main reason for patient non-adherence. Many of the enrolled patients were from rural areas where they don't have access to health care services or medications.

Some patients 18(46.15%) stop their medication because lack of family support or motivation. This may be due to poor knowledge and attitude of family and society towards the disease. Clinical pharmacist can be an effective tool to counsel the family and friends regarding the disease as well as to change their attitudes towards it.

Fear of side effect 14(35.9%) of medications was the problem for some patients to continue their therapy. This problem was solved by counseling the patients regarding side effects of each drug and rescue action to be taken when it happens.

Some patients thought medication was not acting and it is no more beneficial for them and hence they stopped the medications 14 (35.9%). This may be due to progression of disease and inappropriate therapy. Here clinical pharmacist can change the drug or dose or provide combination therapy. Very few patients 17(43.59%) told that, they were stopped the medication due to fear of becoming dependent on treatment. This may be the reason for many chronic diseases including asthma and COPD where the long term treatment is required to treat or control the disease. Here clinical pharmacist can motivate the patients to continue the therapy by psychological counseling.

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