

**STUDIES ON MEDICATION ADHERENCE AND QUALITY OF LIFE IN TUBERCULOSIS PATIENTS**

Nasara Reddy Nakka¹, M. Geeravani¹, M. Kranthi kumar¹, Tejaswi.V¹, K. Mudiyarasan², G. Gopala krishnan³

¹Rajah Muthiah Medical College and Hospital, Annamalai University, India- 608002

²Department of TB&CHEST, Rajah Muthiah Medical College and Hospital, Annamalai University, India- 608002

³Department of Pharmacy, Annamalai University, India- 608002

***Corresponding author e-mail:** nasarredden6@gmail.com

ABSTRACT

Tuberculosis is a serious public health issue causing immense morbidity, mortality, and distress. This prospective study was conducted at DOTS centre in the Department of TB&CHEST at RMMCH. Pre-determinant questionnaire was used to assess the patient's knowledge and adherence before and after counselling. Pill Count Method was used to assess the medication adherence rate on the monthly basis. WHO-QoL BREF which has four domains was used to assess the impact of TB on QoL. Before treatment, scores in all domains were significantly lower in patients than controls, more affected were psychological and social relationship domains. Gradual increase in scores was observed over the course of the treatment and counselling. Hence patient counselling shows positive impact on understanding their illness, the role of the medications in the treatment for improving adherence rates. This would enable health care professionals to devise relevant interventions such as patient counselling which would be useful in further improving quality of TB control programs.

Key words: Tuberculosis (TB), Quality of Life (QoL), WHO-QoL BREF, Medication adherence.

INTRODUCTION

Tuberculosis is one of the most important public health problem worldwide. It has got the high priority within the health sectors^[1, 2]. India accounts for one fifth of the global TB burden i.e., 1.98 million out of 9.4 million new cases annually. It is also estimated that about 2, 76,000 people die due to TB annually in India^[3]. Approximately one person dies of TB in India each minute [*Times of India*, August 29 2003]. National TB programme was started in 1962 to provide free treatment, with the objectives to reduce the morbidity and mortality and thus to reduce disease transmission. The stop TB strategy with Millennium development six goals implies to reverse the incidence of TB by 2015 and fixed the target to reduce prevalence of and death due to TB 50% compared with a baseline of 1990 by 2015^[4]. The

directly observed treatment short course (DOTS) was launched in 1997 as the main strategy in control of TB. The programme exercises the negativity of the sputum and increase in weight as predicted indicators but any other health magnitudes are not considered. There are various aspects of TB that may lead to a reduction in quality of life. Social stigma associated with this disease may also leave the patients feeling shunned and isolated from others^[5]. In some groupings, TB patients are considered as a source of infection that results in social rejection and isolation which can lead to a long term impairment of social well-being^[6]. Considering these effects it shows that for a thorough assessment of patient's health status is essential to consider the overall effect of TB on health and patients perception of well-being, apart from clinical, radiologic, and bacteriological assessments^[7]. This can be performed by measuring

the Quality of Life (QoL) that has several dimensions. In the present study, WHO QoL (BREF) which has the four domains was used to assess the effect of TB and anti-tubercular therapy on QoL^[8]. Adherence to the treatment is a key factor to treatment success, Non-adherence to TB treatment can lead to prolonged periods of infectiousness, relapse, emergence of drug-resistance, and increased morbidity and mortality^[9,10]. In this study pill count method is used to measure the adherence and also assessed whether patient education or counselling, or both, promotes adherence to TB treatment.

Aim of the study:

To improve medication adherence and QOL by patient counselling, conducted in the Department of TB&CHEST which is also a DOTS centre at Rajah Muthiah Medical College and Hospital, Annamalai Nagar- 608 002, Tamilnadu, India, a 1400 bedded multi-speciality tertiary care teaching hospital.

MATERIALS AND METHODS

This is a prospective study conducted in Rajah Muthiah Medical College and Hospital with educational intervention carried out over a period of six months. A total of 60 patients of all age groups who are diagnosed with pulmonary and extra-pulmonary tuberculosis were included in this study and the patients with other respiratory co-morbidities, any other complications, pregnant women and Patients who are not willing to co-operate are excluded from the study. Of the 60 patients enrolled, 53 patients who completed all follow up visits were included in the study. The other 7 patients withdrew from the study because couldn't be followed off. Control (n=26) were selected randomly from the general population catered to by the DOT centre. Both the test and control groups were explained about the purpose of the study. The first step is to obtain Informed consent form (in vernacular language) from the patients. The next step is Patient data collection form was designed to collect the data like patient name, Age, Sex, Occupation, Contact address, chief complaints, DOTS regimen starting and ending date, Past history, Personal history, Family history, Category of the patient, Type of the patient, Disease classification, Smear test result, Other lab investigations, Drug and Dosage given to the patient. Counselling was done to educate the patient on the disease, drug therapy and the need of medication adherence. A pre determinant questions were used to assess the patients Knowledge and medication adherence before and after counselling. Patients were interviewed using pre-designed, pre-tested questionnaire (WHO QoL BREF) which was a

26-item scale designed by WHO. It has four domains viz: physical health, psychological health, social relationships, and environment. The four domain scores denoted an individual's perception of QoL in each particular domain. Questions were translated in vernacular language while interviewing the patients. Patients were interviewed at the starting of the treatment, at the completion of initial and continuation phase using the same scale. Data were entered in MS excel and analysed using SPSS software. For comparison of the mean scores between the test and control groups, independent t-test was used. At the end of the study, counselling was also provided to the control group patients also.

RESULTS

A total number of 60 patients were enrolled in the study and were randomised to control and test groups. Of the 60 enrolled, 53 patients (27 test and 26 Control) who completed all follow-up visits were included in analysis. The other 7 patients withdrew from the study because couldn't be followed up.

DISCUSSION

TB is a serious public health issue causing immense morbidity, and distress not only to individuals but also to communities. It kills more adults in our country than any other infectious disease. In this study the disease incidence picks at the most economically age group of 15-60 years. Unsuccessful treatment not only encourages the mortality but also increases further health and economic burden to the community. One of the reasons for unsuccessful treatment is the non-adherence. Poor adherence towards the drug therapy is the most common cause of initial treatment failure and reversion of disease in tuberculosis worldwide. However there are different methods for the assessment adherence. Among the methods most widely used, collection of urine samples at 0, 1, 2, 4 & 6 months of the study and has showed that compliance rates are higher at the first month compared to the second, fourth, six months Khalili H et.al^[11]. We selected Pill count method to assess the adherence. The study shows a slight increase of medication adherence rate in test group compared to control group, these shows that the patients aware of the need of treatment compliance. A pre determinant questions were used to assess medication adherence and the patient's knowledge before and after counselling. The patients Knowledge on causes and symptoms, modes of transmission, complication, and measures to prevent the spreading of the infection were assessed. There is significant differences observed in this parameters on data of pre

and post counselling. The same questions were also been used by Saria Tasmin et al ^[12], shows Knowledge about cause and treatment of tuberculosis among TB patients was quite good, however, misconceptions also exist. We selected the WHO BREF-26 scale as this considers the impact of disease on various environmental factors which need to be considered not only in patients of TB but also in any chronic illness which needs long-term treatment. The same scale was used by Meera Dhuria et al ^[13], who compared the QoL scores in patients of TB with that in normal population showing lower mean scores than the controls worst affected were physical domain followed by psychological domain. In this study in order to measure the impact of counselling, we had a control group which is not counselled in the beginning, but counselled at the end of the study. Of all the domain scores assessed worst affected were social and psychological domains. The mean scores before and after counselling for test group found to be significantly different when compared to the control group.

CONCLUSION

Counselling provided to the patients has achieved improve understanding and knowledge on the

disease, benefiting the people. The mainstay of TB control is organising and administering standardised treatment across the country for all adult and paediatric TB cases. Pharmacists already contribute to the safe and effective use of medicines throughout the healthcare system. They should educate patients on the importance of continuing their treatment regimen despite symptomatic improvement. Pharmacists should become part of a multidisciplinary team (with nurses, physicians, social workers) to successful treatment of TB patients and their families. These study shows a slight increase of adherence rate in test group compares to control group. These shows that the patients aware of the need of treatment. At the baseline all patients had poor knowledge and attitude towards their disease and thus poor QoL i.e., mainly Social and Psychological domains. At the end of the study, patients of test group received extensive counselling shows significant difference compared to control group. This would enable health care professionals to devise relevant interventions such as patient counselling which would be useful in further improving quality of TB control programs.

Table 1: Age wise distribution of patients

| Age (in years) | Test(26) | Control(27) |
|----------------|-----------|-------------|
| 0-10 | 1(3.84%) | 2(7.69%) |
| 11-20 | 5(19.23%) | 4(14.8%) |
| 21-30 | 3(11.5%) | 4(14.8%) |
| 31-40 | 5(19.23%) | 3(11.11%) |
| 41-50 | 5(19.23%) | 6(22.22%) |
| 51-60 | 5(19.23%) | 3(11.11%) |
| 61-80 | 2(7.69%) | 4(14.8%) |

Table 2: Demographic data based on gender

| S. No | Gender | Test | Control |
|-------|--------|------|---------|
| 1. | Male | 11 | 14 |
| 2. | Female | 16 | 13 |

Table3: Symptoms of PTB involved in the study

| Symptoms of PTB | % Of patients effected |
|-------------------------|------------------------|
| Night fever | 18.3% |
| Productive cough | 35% |
| Loss of weight | 30% |
| Cough more than 3 weeks | 41.6% |
| Chest pain | 25% |
| Shortness of breath | 31.6% |

| | |
|-------------------|-------|
| Cough with sputum | 40% |
| Haemoptysis | 13.3% |

Table 4: Distribution of patients based on site of disease

| S.no | Site of disease | Test | Control |
|------|-----------------|------|---------|
| 1. | PTB | 17 | 18 |
| 2. | Extra PTB | 10 | 8 |

Table 5: Family history of the patients with TB

| Family history | Present | Absent |
|----------------|---------|--------|
| No.of patients | 18 | 42 |
| Percentage | 30% | 70% |

Table 6: Place of residence

| Place of residence | Rural | Urban |
|--------------------|-------|-------|
| No.of patients | 28 | 32 |
| Percentage | 46.6% | 53.3% |

Table 7: Category wise distribution of the patients

| Site of disease | Category I | Category II | AKT ₄ |
|---------------------|------------|-------------|------------------|
| PTB | 27(45%) | 4(6.66%) | 2(3.3%) |
| EXTRA PTB | 10(16.6%) | 8(13.3%) | - |
| Prophylaxis for PTB | 2(3.3%) | - | - |

Table 8: Patients put on treatment based on smear results for PTB

| Category | Pulmonary tuberculosis | | | |
|----------|------------------------|----------------|-------------|--------|
| | Smear positive | Smear negative | | Others |
| | | Adults | Paediatrics | |
| I | 20 | 6 | - | 4 |
| II | 3 | 2 | - | - |
| Total | 23 | 8 | - | - |

Table 9: Effect of patient counselling on knowledge on modes of transmission of disease

| Modes of transmission of disease | Pre counselling | Post counselling |
|---|-----------------|------------------|
| Do you know | 11.5% | 38.4% |
| Through smoking | 7.69% | 19.2% |
| Through unhygienic condition | 11.6% | 30.6% |
| Familial | 11.6% | 25% |
| Through irregular diet | 7.69% | 19.2% |
| Handshakes with TB patients | 11.6% | 7.69% |
| Eating from the same plate | 7.9% | 3.8% |
| Inhalation of droplets of nuclei in air generated by TB patients through coughing | 11.6% | 38.4% |

Table 10: knowledge assessment about disease and treatment

| Knowledge assessment about disease and treatment | % of patients having knowledge | |
|--|--------------------------------|------------------|
| | Pre counselling | Post counselling |
| Do you know the consequence of not treating TB | 19.2% | 27.69% |
| Is TB curable | 42.3% | 57.6% |
| Course of treatment | 38.4% | 53.3% |
| Dots therapy | 7.69% | 19.2% |
| Do you know government of India | 65.3% | 76.9% |

Table 11: Adverse drug events monitored

| Adverse drug events observed | Percentage of patients experienced |
|------------------------------|------------------------------------|
| Nausea | 16.6% |
| Vomiting | 23.3% |
| Itching | 3.33% |
| Abdominal pain | 6.6% |
| Dark coloured urine | 38.3% |
| Diminished eye vision | 6.6% |
| Decreased hearing | 3.3% |
| Joint pain | 3.3% |

Table 12: Medication adherence assessment in control group

| Patient number | Monthly assessment in percentage | | | | | |
|----------------|----------------------------------|-------|-------|-------|-------|-------|
| | Nov | Dec | Jan | Feb | Mar | Apr |
| 1 | 100% | 100% | 100% | 75% | 100% | 100% |
| 2 | 100% | 100% | 100% | 100% | 100% | 100% |
| 3 | 50% | 100% | 75% | 100% | 100% | 100% |
| 4 | 75% | 75% | 100% | 100% | 100% | 100% |
| 5 | 100% | 100% | 100% | 75% | 100% | 100% |
| 6 | 100% | 100% | 50% | 75% | 100% | 100% |
| 7 | 100% | 50% | 100% | 100% | 100% | 100% |
| 8 | 100% | 100% | 100% | 100% | 100% | 100% |
| 9 | 100% | 100% | 50% | - | - | - |
| 10 | 100% | 100% | 100% | 75% | 100% | 100% |
| 11 | 100% | 50% | 100% | 75% | 100% | 100% |
| 12 | 100% | 100% | 100% | 75% | 50% | 100% |
| 13 | 75% | 75% | 100% | 75% | 100% | 100% |
| 14 | 100% | 100% | 100% | 100% | 100% | 100% |
| 15 | 75% | 75% | 100% | - | - | - |
| 16 | 75% | 75% | 100% | 100% | 100% | 100% |
| 17 | 100% | 100% | 100% | 100% | 100% | 100% |
| 18 | 100% | 50% | 100% | 100% | 100% | 100% |
| 19 | 100% | 100% | 100% | 100% | 100% | 100% |
| 20 | 100% | 100% | 100% | 100% | 100% | 100% |
| 21 | 100% | 100% | - | - | - | - |
| 22 | 100% | 75% | 100% | 100% | 100% | 100% |
| 23 | 75% | 100% | 100% | 100% | 75% | 100% |
| 24 | 100% | 100% | 100% | 75% | 100% | 100% |
| 25 | 100% | 100% | 100% | 100% | 100% | 100% |
| 26 | 100% | 100% | 100% | 75% | 75% | 100% |
| Average | 93.2% | 89.4% | 91.3% | 82.3% | 84.6% | 88.4% |

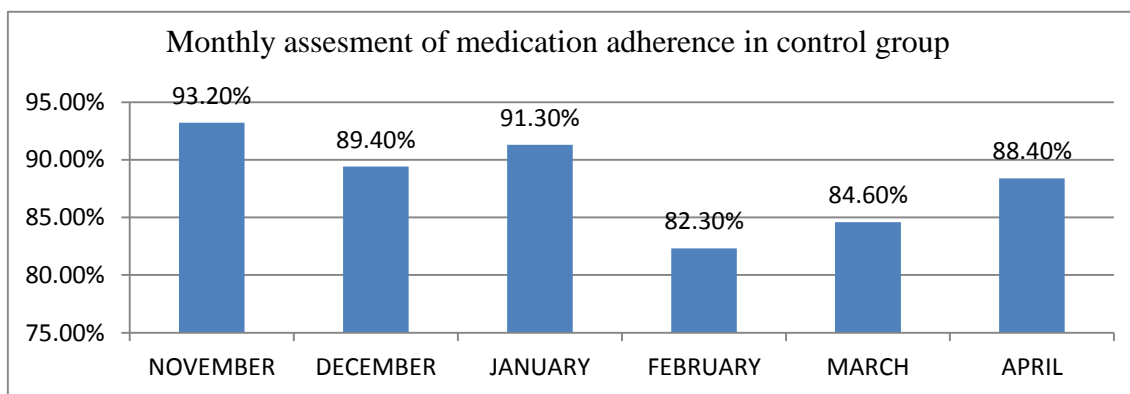


Figure 1: Monthly assesment of medication adherence in control group

Table 13: Medication adherence assessment in test group

| Patient Number | Monthly assessment in percentage | | | | | |
|----------------|----------------------------------|-------|-------|-------|-------|-------|
| | NOV | DEC | JAN | FEB | MAR | APR |
| 1 | 100% | 100% | 100% | 100% | 100% | 100% |
| 2 | 100% | 50% | 100% | 100% | 100% | 100% |
| 3 | 100% | 100% | 100% | 100% | 100% | 100% |
| 4 | 100% | 100% | 100% | 100% | 100% | 100% |
| 5 | 100% | 100% | 75% | 75% | 100% | 100% |
| 6. | 100% | 75% | 100% | 100% | 100% | 100% |
| 7 | 75% | 100% | 100% | 100% | 75% | 100% |
| 8 | 100% | 100% | 100% | 75% | 100% | 100% |
| 9 | 100% | 100% | 100% | 100% | 100% | 100% |
| 10 | 100% | 100% | 100% | 75% | 75% | 100% |
| 11 | 100% | 100% | 100% | - | - | - |
| 12 | 75% | 100% | 100% | 75% | 100% | 100% |
| 13 | 100% | 75% | 100% | 100% | 100% | 100% |
| 14 | 100% | 100% | 100% | 100% | 100% | 100% |
| 15 | 100% | 100% | 75% | 100% | 100% | 100% |
| 16 | 75% | 75% | 100% | 100% | 100% | 100% |
| 17 | 100% | 100% | 100% | 100% | 100% | 100% |
| 18 | 100% | 50% | 100% | 100% | 100% | 100% |
| 19 | 100% | 100% | 100% | 100% | 100% | 100% |
| 20 | 100% | 100% | 100% | 100% | 100% | 100% |
| 21 | 100% | 100% | 75% | 75% | 100% | 100% |
| 22 | 100% | 75% | 100% | 100% | 100% | 100% |
| 23 | 75% | 100% | 100% | 100% | 75% | 100% |
| 24 | 100% | 100% | 100% | 75% | 100% | 100% |
| 25 | 100% | 100% | 100% | 100% | 100% | 100% |
| 26 | 100% | 100% | 100% | 75% | 75% | 100% |
| 27 | 100% | 100% | 100% | 100% | 100% | 100% |
| Average | 96.2% | 92.5% | 97.2% | 89.8% | 92.5% | 96.8% |

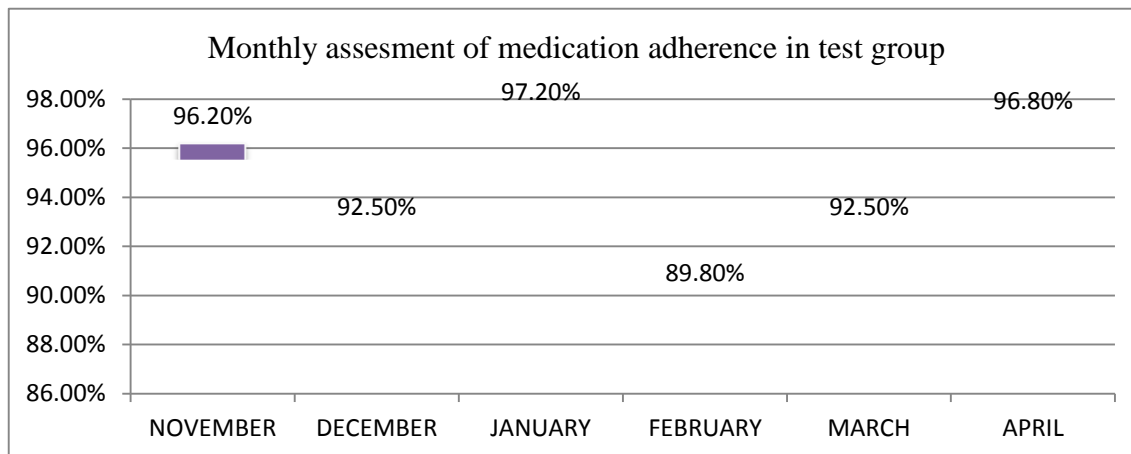


Figure 2: Monthly assessment of medication adherence in test group

Table 14: Monthly medication adherence assessment in test and control group

| Month | Control | Test |
|----------|---------|-------|
| November | 93.2% | 96.2% |
| December | 89.4% | 92.5% |
| January | 91.3% | 97.2% |
| February | 82.3% | 89.8% |
| March | 84.6% | 92.5% |
| April | 88.4% | 96.8% |

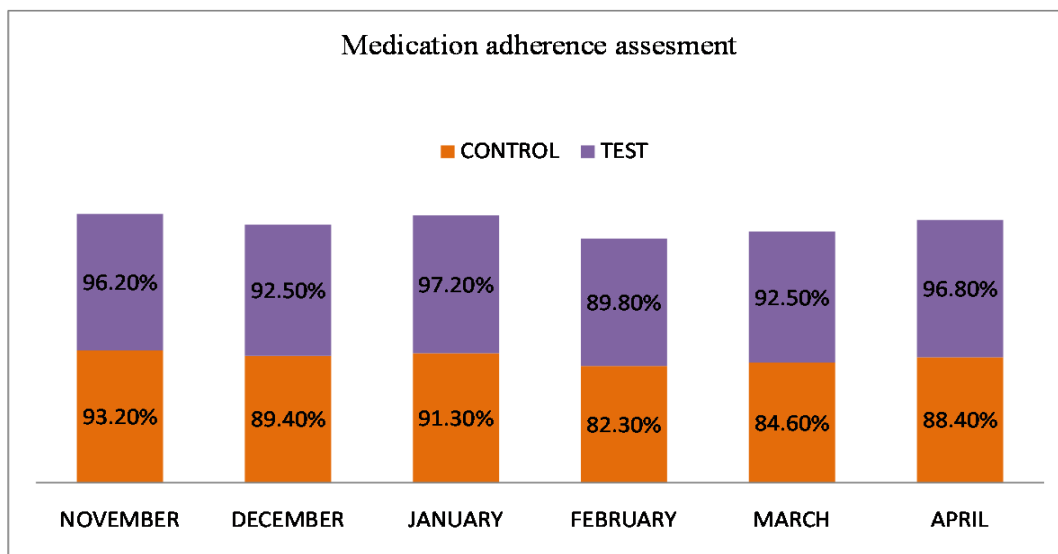


Figure 3: Medication adherence assessment

Table 15: QoL assessment in control group

| S.NO. | Physical activity (d1) | | Psychological (d2) | | Social relationships (d3) | | Environment (d4) | |
|---------|------------------------|------|--------------------|------|---------------------------|------|------------------|------|
| | 0-100 scale | | 0-100 scale | | 0-100 scale | | 0-100 scale | |
| | Pre | Post | Pre | Post | Pre | Post | Pre | Post |
| 1 | 50 | 63 | 16 | 25 | 25 | 31 | 44 | 56 |
| 2 | 50 | 69 | 19 | 31 | 19 | 44 | 44 | 56 |
| 3 | 65 | 81 | 25 | 38 | 25 | 44 | 50 | 63 |
| 4 | 54 | 63 | 31 | 44 | 31 | 50 | 50 | 63 |
| 5 | 44 | 50 | 25 | 38 | 19 | 25 | 56 | 63 |
| 6. | 55 | 69 | 19 | 31 | 19 | 31 | 50 | 63 |
| 7 | 38 | 56 | 25 | 31 | 25 | 50 | 50 | 63 |
| 8 | 49 | 63 | 19 | 45 | 31 | 44 | 44 | 63 |
| 9 | 56 | 63 | 25 | 44 | 19 | 31 | 56 | 69 |
| 10 | 55 | 68 | 31 | 50 | 19 | 25 | 44 | 56 |
| 11 | 44 | 63 | 16 | 25 | 25 | 44 | 56 | 69 |
| 12 | 44 | 50 | 18 | 31 | 31 | 50 | 50 | 63 |
| 13 | 56 | 81 | 25 | 44 | 25 | 44 | 50 | 69 |
| 14 | 38 | 50 | 31 | 44 | 19 | 44 | 44 | 63 |
| 15 | 44 | 69 | 16 | 31 | 25 | 44 | 50 | 63 |
| 16 | 31 | 56 | 19 | 25 | 19 | 31 | 44 | 50 |
| 17 | 44 | 56 | 25 | 31 | 25 | 44 | 50 | 69 |
| 18 | 50 | 63 | 31 | 38 | 31 | 44 | 44 | 56 |
| 19 | 50 | 54 | 25 | 44 | 19 | 31 | 44 | 63 |
| 20 | 56 | 74 | 19 | 38 | 31 | 50 | 56 | 63 |
| 21 | 44 | 63 | 25 | 25 | 19 | 25 | 56 | 69 |
| 22 | 50 | 69 | 19 | 31 | 19 | 31 | 44 | 69 |
| 23 | 31 | 81 | 25 | 44 | 25 | 44 | 44 | 56 |
| 24 | 56 | 63 | 31 | 44 | 31 | 44 | 50 | 69 |
| 25 | 44 | 50 | 19 | 31 | 25 | 44 | 31 | 50 |
| 26 | 38 | 63 | 32 | 50 | 19 | 25 | 44 | 69 |
| Average | 40.2 | 53.8 | 20.8 | 36 | 24.8 | 38 | 45 | 59.2 |

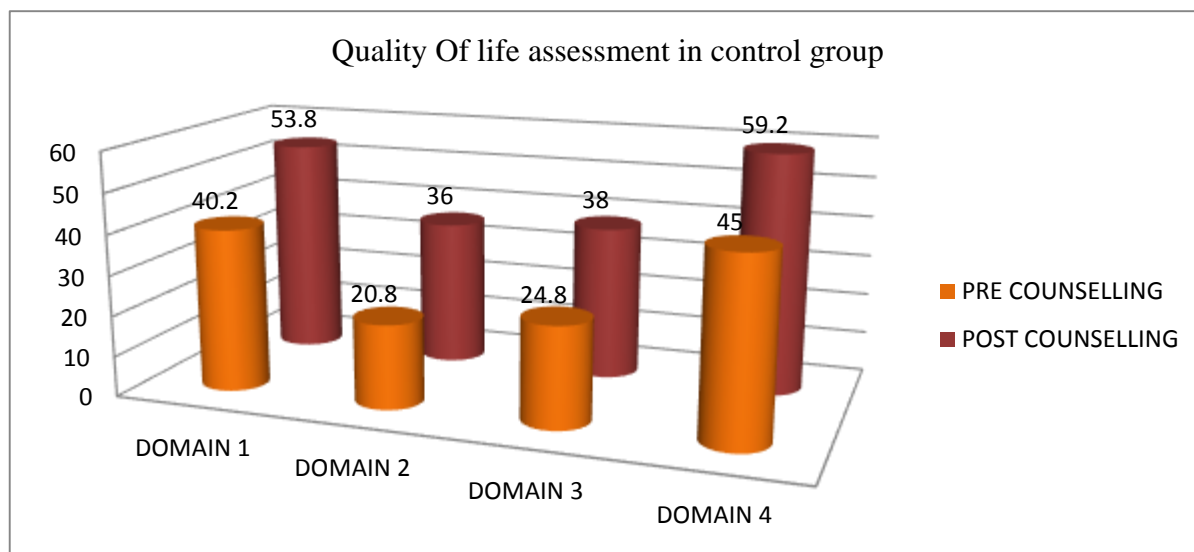


Figure 4: QoL assessment in control group

Table 16: QoL assessment in test group

| S.no | Physical activity (d1) | | Psychological (d2) | | Social relationships (d3) | | Environment (d4) | |
|---------|------------------------|------|--------------------|------|---------------------------|------|------------------|------|
| | 0-100 scale | | 0-100 scale | | 0-100 scale | | 0-100 scale | |
| | Pre | Post | Pre | Post | Pre | Post | Pre | Post |
| 1 | 31 | 44 | 16 | 31 | 19 | 31 | 19 | 44 |
| 2 | 25 | 44 | 19 | 31 | 25 | 44 | 13 | 38 |
| 3 | 44 | 56 | 25 | 44 | 31 | 50 | 25 | 44 |
| 4 | 31 | 44 | 31 | 44 | 31 | 44 | 31 | 50 |
| 5 | 38 | 50 | 44 | 56 | 19 | 31 | 38 | 56 |
| 6. | 25 | 44 | 38 | 50 | 25 | 44 | 50 | 63 |
| 7 | 19 | 31 | 16 | 31 | 19 | 31 | 31 | 50 |
| 8 | 31 | 44 | 19 | 31 | 25 | 44 | 25 | 44 |
| 9 | 50 | 63 | 13 | 25 | 19 | 31 | 38 | 56 |
| 10 | 44 | 56 | 31 | 44 | 31 | 50 | 50 | 63 |
| 11 | 38 | 50 | 16 | 25 | 25 | 44 | 56 | 63 |
| 12 | 25 | 38 | 44 | 56 | 31 | 50 | 44 | 63 |
| 13 | 31 | 44 | 19 | 44 | 19 | 31 | 31 | 50 |
| 14 | 25 | 44 | 38 | 50 | 25 | 44 | 38 | 56 |
| 15 | 19 | 38 | 16 | 31 | 6 | 25 | 50 | 63 |
| 16 | 38 | 50 | 19 | 21 | 19 | 31 | 44 | 63 |
| 17 | 50 | 63 | 25 | 44 | 25 | 44 | 38 | 56 |
| 18 | 25 | 38 | 38 | 50 | 31 | 50 | 31 | 50 |
| 19 | 31 | 44 | 16 | 25 | 25 | 44 | 44 | 63 |
| 20 | 50 | 63 | 31 | 56 | 19 | 31 | 50 | 63 |
| 21 | 19 | 31 | 16 | 25 | 31 | 50 | 56 | 63 |
| 22 | 25 | 38 | 25 | 44 | 6 | 25 | 25 | 44 |
| 23 | 38 | 50 | 13 | 25 | 19 | 31 | 38 | 56 |
| 24 | 19 | 38 | 16 | 31 | 25 | 44 | 31 | 50 |
| 25 | 25 | 38 | 19 | 31 | 31 | 50 | 44 | 63 |
| 26 | 38 | 50 | 38 | 50 | 25 | 44 | 50 | 63 |
| 27. | 44 | 56 | 31 | 56 | 19 | 44 | 25 | 44 |
| Average | 39.5 | 49.5 | 25.6 | 38.1 | 23.5 | 39.9 | 39 | 55.2 |

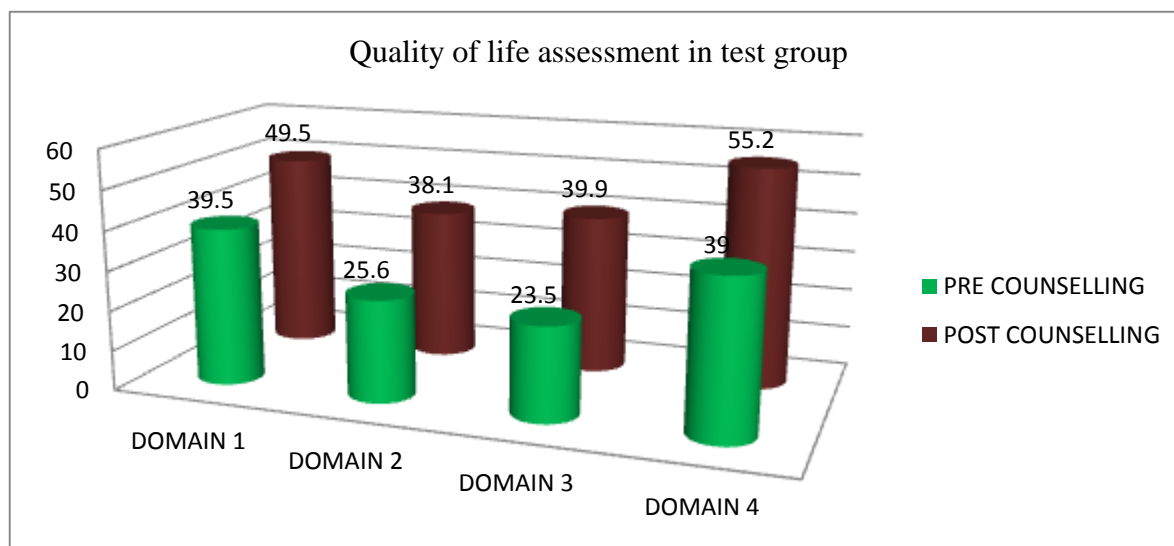


Figure 5: QoL assessment in test group

Table 17: Impact of counselling of QoL based on mean scores

| Group | Pre counselling | Post counselling | Significance |
|-------------|-----------------|------------------|--------------|
| Control(26) | 45.735±5.020 | 50.630±5.141 | Yes |
| Test (27) | 47.587±5.523 | 57.606±6.422 | Yes |

The difference in the mean values of the two groups (Test pre and post counselling) is greater than would be expected by chance; there is a statistically significant difference between the input groups ($P < 0.001$) $t = 5.08$. For control group pre and post counselling $t = 2.573$ ($P = 0.117$).

REFERENCES

1. Report on the global Tuberculosis Epidemic by World Health Organisation, Geneva, <http://www.who.int/topics/tuberculosis/index.html>.
2. Joseph T. Dipiro, Robert L. Talbert, Gary C. Yee, et al. Pharmacotherapy A pathophysiologic Approach, 7th edition. Mc Graw Hill. 2009, PP. 1839.
3. RNTCP DOTS sure cure for TB Medical officer Training Modules I-IV pg no: 14-24.
4. Stop TB partnership and WHO: The Stop TB Strategy: building on and enhancing DOTS to meet the TB related Millennium Development Goals, Geneva, Switzerland, 2006.
5. Yamada S, Caballero J, Matsunaga DS, Agustin G, Magana M. Fam Med 1999; 31:477-82.
6. Liefoghe R, Michiels N, Habib S, Moran MB, De Muynck A. Soc Sci Med 1995; 41:1685-92.
7. Dhjngra VK, Rajpal S. Indian Journal of Tuberculosis 2003; 50:99-104.
8. WHOQOL-BREF Introduction, Administration, Scoring and Generic Version of the Assessment. Field trial version December 1996 by World Health Organization, Geneva. http://www.who.int/mental_health/media/en/76.pdf.
9. Paul Garner, Helen Smith, Salla Munro, Jimmy Volmink. Bull World Health Organ 2007 May; 85(5): 404-406.
10. Salla A. Munro, Simon A. Lewin, Helen J. Smith, Mark E. Engel, Atle Fretheim, Jimmy Volmink, PLoS Medicine 2007; vol-4: 1230-1242.
11. Khalili H, Dashti-khavidaki S, Sajadi S, Hajiabolfaghi M. DARU 2008; Vol.16: PP. 47-50.
12. SariaTasnim, AminurRahman and F. M. AnamulHoque. Pulmonary Medicine: 2012: Article ID 352850: 5 pages.
13. MeeraDhuria, Nandini Sharma, GK Ingle. Indian Journal of Community Medicine January 2008; Vol. 33: PP. 58-59