

Beyond ‘cure’ and ‘treatment success’: quality of life of patients with multidrug-resistant tuberculosis

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SUMMARY

SETTING: Two drug-resistant tuberculosis (DR-TB) sites (MSF Clinic, Jupiter Hospital) in Mumbai, India.

OBJECTIVE: To assess health-related quality of life (HRQoL) and associated factors among DR-TB patients and explore their perspectives about HRQoL.

DESIGN: We used a mixed-methods design: a quantitative cross-sectional questionnaire (the World Health Organization’s Quality of Life Brief Questionnaire [WHOQoL-BREF]); and qualitative in-depth interviews for purposively selected patients. Assessments were conducted between April and November 2016.

RESULTS: Ninety-five patients completed WHOQoL-BREF; 12 were interviewed. The psychological and physical health domains were the most affected (mean scores $56.2 \pm$ standard deviation [SD] 18.3, and $56.5 \pm$ SD 15.1, respectively; maximum 100). The social relations and environmental domains mean scores were

respectively 68.6 (SD ± 21.1) and 60.3 (SD ± 15.9). Loss of jobs due to TB adversely affected the social relations and environmental domains. Qualitative analysis showed that support was the most important theme affecting quality of life. Other themes were physical factors (e.g., treatment adverse events), psychological factors (e.g., depression), social functioning (e.g., fear of stigmatisation) and environmental factors (e.g., health systems).

CONCLUSION: HRQoL was lower among study participants, but not as low as previously reported among TB patients. Support was the main factor that positively affected HRQoL, although both disease and treatment were physically and socially challenging.

KEY WORDS: MDR-TB; XDR-TB; quality of life; operational research; SORT IT

TREATMENT SUCCESS AMONG NEW tuberculosis (TB) patients is currently about 85%, while among patients with multidrug-resistant TB (MDR-TB; defined as resistance to at least isoniazid [INH] and rifampicin [RMP]) it is poor (~50%), with high rates of death and loss to follow-up.^{1,2} This has been attributed to several factors, including the long duration of treatment, poor standard of care, toxic and less potent second-line anti-tuberculosis drugs, poor nutritional status, alcohol and substance abuse during treatment and lack of adequate patient support. These factors also affect patients’ health-related quality of life (HRQoL). However, most studies have focused on clinical or programmatic outcomes among TB patients and not on quality of life (QoL).^{1,3,4}

HRQoL is a patient-reported outcome measure⁵ which has been defined⁶ to include physical, psychological, emotional, and social well-being, and role functioning and the perceptions thereof.^{7,8} Measuring

HRQoL is important because functional capacity, well-being and the experience of illness are more important to patients than bacteriological cure alone.^{9,10} As stated by McDowell, ‘patients want to live, not merely survive’.⁶ Moreover, clinicians can underestimate the impact of disease and treatment on QoL.¹¹

Most HRQoL studies in TB have been with drug susceptible (DS-TB, defined as susceptible to both isoniazid and rifampicin) patients,^{8,12,13} with reports of significantly lowered quality of life both in patients with active TB at all stages of treatment and after successful completion of treatment, as compared to both latent TB infection and healthy controls.^{14–18}

There is limited evidence about HRQoL among MDR-TB patients receiving treatment.^{8,12,13} No studies have measured HRQoL among patients with extensively drug-resistant TB (XDR-TB; defined as MDR-TB plus resistance to a fluoroquinolone and second-line injectables). Impaired respiratory func-

tion post-treatment in Brazilian MDR-TB patients reduced their QoL.¹⁹ The sole Indian study reported lower QoL among MDR-TB patients than among DS-TB patients and healthy controls.²⁰ However, there is limited evidence from different settings with differing standards of care and on factors affecting QoL during treatment of MDR-TB, particularly around patients' perspectives. Studies addressing these limitations would provide insights for designing interventions to improve patient support and care.

The present study assessed HRQoL among MDR-TB patients (including XDR-TB patients) in Mumbai, India, the factors associated with it and patients' perspectives about their HRQoL.

METHODS

Study design

We used a mixed-methods design in which quantitative (cross-sectional survey) and qualitative (in-depth) data were simultaneously collected. This design was used to increase the breadth and depth of understanding^{11,12,21} about HRQoL by elucidating patients' experiences about their HRQoL.

Study setting

The study was conducted in two TB clinics in Mumbai, Médecins Sans Frontières (MSF) Clinic and Jupiter Hospital. Mumbai, a district in the state of Maharashtra, India, is a megapolis of 12.5 million people,²² that contributes 22% of TB patients reported in the state.²³ The prevalence of any drug resistance is very high, at 24% and 41% in new and previously treated patients, respectively,²⁴ and 34% among TB patients coinfecting with the human immunodeficiency virus (HIV).²⁵

MSF has been operating a drug-resistant TB (DR-TB) and HIV clinic in Mumbai since 2006. Patients are looked after by medical and patient support teams. Individualised treatment regimens, based on drug susceptibility patterns, are provided free of charge for 24–28 months. Bedaquiline and delamanid are available for compassionate use. A patient support team helps patients complete their treatment successfully, and patients receive treatment through an ambulatory care programme, as described elsewhere.²⁶

Jupiter Hospital is a private multispecialty hospital in Thane, near Mumbai. The hospital has a dedicated team for TB patient management. Patients are treated using individualised treatment regimens guided by drug susceptibility testing. Patients pay out of pocket for treatment. Counselling services and psychiatric support are available to patients.

Study participants

Quantitative

All adult patients (age ≥ 18 years) receiving treatment for DR-TB at MSF Mumbai Clinic and Jupiter

Hospital between April and November 2016 and who consented to participate were included.

Qualitative

In-depth interviews were conducted with purposively selected participants chosen from among those who completed the World Health Organization's Quality of Life Brief Questionnaire (WHOQoL-BREF) to maximise diversity (age, sex, TB type, place of treatment). Interviews were conducted at a date, time and place convenient for the participant.

Data collection and tools

Quantitative

The quantitative phase consisted of a cross-sectional survey of participants using WHOQoL-BREF. WHOQoL-BREF is a validated tool that assesses individuals' perceptions of their QoL in the context of their culture and values.^{8,12,13,27} WHOQoL-BREF has 26 questions in four domains—physical, psychological, social and environmental. Scores range from zero to 100: higher scores denote a better QoL. The Hindi version of WHOQoL-BREF has been validated.²⁸ Permission was obtained from the WHOQoL Group, Geneva, Switzerland, to use WHOQoL-BREF. The questionnaire was self-administered for participants who could comprehend it; otherwise, it was administered by an interviewer.

Qualitative

In-depth interviews generated responses on the themes of general health perceptions, physical health, social functioning, role functioning (at work, home and society), psychological and spiritual well-being, and patient-perceived factors affecting HRQoL, with suggested measures to improve HRQoL.

Interviews were conducted by the principal investigator and another researcher, both trained in qualitative research methods. An interview guide with open-ended questions was used, which was modified based on the key results of previous interviews. All interviews were audio-recorded with prior permission. Saturation determined the number of participants.²⁹

Analysis

Quantitative

Quantitative data were double-entered, validated and analysed using EpiData (v3.1 for entry, v2.2.2.183 for analyses; EpiData Association, Odense, Denmark). WHOQoL-BREF was scored according to the WHO manual using SPSS v20 (IBM, Armonk, NY, USA). We assessed associations between demographic and other variables with WHOQoL-BREF scores.

Qualitative

In-depth interviews were transcribed and translated into English immediately after interview. Transcripts

Table 1 Sociodemographic distribution of drug-resistant tuberculosis patients at MSF Clinic and Jupiter Hospital in Mumbai, India

	<i>n</i> (%)
Overall	95
Age, years, median [IQR]	28 [22–37]
Sex	
Male	35 (37)
Female	60 (63)
Education	
Primary	9 (10)
Secondary	33 (35)
Higher Secondary	21 (22)
Undergraduate degree	24 (25)
Professional degree	8 (8)
Health facility	
MSF Clinic	62 (65)
Jupiter Hospital	33 (35)
HIV	
Positive	4 (4)
Negative	91 (96)
TB resistance pattern	
MDR-TB*	23 (24)
Pre-XDR-TB†	28 (29)
XDR-TB‡	30 (32)
Extremely drug-resistant TB§	14 (15)
TB site	
Pulmonary	81 (85)
Extra-pulmonary	14 (15)
Treatment phase	
Intensive phase	61 (64)
Continuation phase	27 (28)
Treatment completed	7 (8)
Alcohol intake	
Yes	2 (2)
No	93 (98)
Tobacco intake (any form)	
Yes	4 (4)
No	91 (96)

* Resistant to at least isoniazid and rifampicin.

† MDR-TB plus resistance to a fluoroquinolone OR a second-line injectable.

‡ MDR-TB plus resistance to a fluoroquinolone and second-line injectable.

§ XDR-TB plus resistance to Group IV and/or Group V anti-tuberculosis drugs.

MSF = Médecins Sans Frontières; IQR = interquartile range; HIV = human immunodeficiency virus; TB = tuberculosis; MDR-TB = multidrug-resistant TB; XDR-TB = extensively drug-resistant TB.

were analysed manually to generate themes and were reviewed by a second investigator to reduce bias. Any difference between the two was resolved by discussion. A thematic network method was used to analyse the data.³⁰ Findings were reported using Consolidated Criteria for Reporting Qualitative Research.³¹

Ethics

The study was explained to all participants and written informed consent was obtained. Ethics clearance was given by the Ethics Advisory Group of the International Union Against Tuberculosis and Lung Disease, Paris, France, and by Jupiter Hospital, Thane, India.

RESULTS

Of the 95 participants enrolled (median age 28 years, interquartile range [IQR] 22–37 years), 63% were

female. Participants' sociodemographic characteristics are given in Table 1. WHOQoL-BREF scores are shown in Table 2.

Twelve in-depth interviews were conducted with six participants each from the two sites (see Table 3 for participant characteristics). We constructed a thematic network and categorised the basic themes under four organising themes (psychological, physical, social and environmental) around the global theme (QoL) and illustrated it in a non-hierarchical diagram (Figure).

Psychological domain

The psychological domain had the lowest mean score of 56.2 (standard deviation [SD] 15). In unadjusted analysis, the psychological domain was significantly associated with age (people in the 26–45 years age group had the lowest scores), sex (men reported lower scores) and TB-induced occupation change (participants who lost work reported lower scores).

Participants reported severe mental health problems, including anxiety, depression and suicidal tendencies. Many required psychiatric consultations and medication to manage psychological conditions. Stress, from an inability to lead a normal lifestyle, further fuelled anxiety and depressive symptoms.

Pill burden, which included daily injections in our study, was a major factor in QoL deterioration. This was reported by all participants, and affected physical, social and psychological functioning. Patients with complex resistance patterns needed treatment with repurposed drugs such as imipenem, administered as an intravenous infusion over 1.5 h twice a day. This completely disrupted their life and schedules, and led to feelings of inadequacy because they were unable to do anything else beyond taking their treatment.

My entire schedule revolves around medicine timings. I cannot do anything for myself or anyone else. . . It's like my injections, then pills, then food, then I sleep and on waking up again, injections and pills and food. That's all left in my life. (29 years, female)

Discolouration of the skin was a major problem, as it was the most visible side effect and led to participants being questioned, with psychological consequences:

I feel ashamed of myself and because of this my self-confidence has shattered. (29 years, female)

TB adversely affected the self-image of participants:

If there is a person on the road who hasn't taken bath for days and is smelly, then we won't go near him as we find him revolting. That's how I feel about myself. (29 years, female)

This negative self-image seemed to be due to the stigma surrounding TB that the participants had

Table 2 WHOQoL-BREF scores among drug-resistant tuberculosis patients in Mumbai, India

	n (%)	WHOQoL-BREF domain scores									
		Physical health mean ± SD	P value	Psychological health mean ± SD	P value	Social relations mean ± SD	P value	Environmental mean ± SD	P value	Total mean ± SD	P value
All participants	95 (100)	56.5 ± 15.1		56.2 ± 18.3		68.6 ± 21.1		60.3 ± 15.9		65.3 ± 24.3	
Age, years											
18–25	37 (38.9)	62.2 ± 14.6	0.01*	62.0 ± 17.9	0.03*	70.1 ± 18.2	0.55	62.2 ± 16.7	0.64	71.6 ± 21.4	0.06
26–45	46 (48.4)	52.7 ± 15.0		51.4 ± 19.4		69.1 ± 23.9		59.2 ± 16.2		59.2 ± 27.1	
46–65	12 (12.6)	53.6 ± 11.8		57.0 ± 7.6		62.5 ± 18.3		58.3 ± 12.1		68.8 ± 15.5	
Sex											
Male	35 (36.8)	55.1 ± 16.9	0.49	49.9 ± 18.2	0.01*	61.7 ± 23.7	0.01*	58.6 ± 14.5	0.43	57.1 ± 28.2	0.03*
Female	60 (63.2)	57.3 ± 14.0		60.0 ± 17.5		72.7 ± 18.4		61.3 ± 16.7		70.0 ± 20.5	
Health facility											
MSF Clinic	62 (65.3)	57.9 ± 16.7	0.14	55.4 ± 20.4	0.67	64.3 ± 22.3	0.01*	58.0 ± 16.6	0.05*	62.5 ± 27.4	0.18
Jupiter Hospital	33 (34.7)	53.9 ± 11.0		57.8 ± 13.7		76.9 ± 15.9		64.6 ± 13.6		70.5 ± 15.9	
Occupation change due to TB (n = 93)											
No change	54 (58.0)	56.6 ± 12.9	0.88	59.7 ± 15.8	0.04*	75.5 ± 17.8	<0.01*	64.0 ± 14.6	0.01*	70.8 ± 19.9	0.02*
Left work	39 (42.0)	56.1 ± 17.8		51.9 ± 20.8		59.3 ± 21.5		55.3 ± 16.7		57.7 ± 28.2	
Housing (n = 93)											
Slum	33 (35.5)	60.5 ± 14.7	0.04*	57.2 ± 18.7	0.71	64.8 ± 18.2	0.23	57.5 ± 13.7	0.2	63.6 ± 28.0	0.67
Other	60 (64.5)	54.0 ± 14.4		55.7 ± 17.6		70.3 ± 22.4		61.7 ± 17.1		65.8 ± 22.1	
TB site											
PTB	81 (85.3)	55.8 ± 15.4	0.29	55.3 ± 18.9	0.22	67.7 ± 21.1	0.32	59.4 ± 16.3	0.19	63.9 ± 25.3	0.16
EPTB	14 (14.7)	60.5 ± 12.6		61.8 ± 13.9		73.8 ± 20.9		65.4 ± 12.5		73.2 ± 15.4	
Resistance pattern											
MDR-TB	23 (24.2)	54.5 ± 10.2	0.46	59.9 ± 13.8	0.11	78.6 ± 17.5	0.07	67.0 ± 11.7	0.01*	72.8 ± 12.9	0.17
Pre-XDR-TB	28 (29.5)	54.0 ± 14.4		49.2 ± 19.9		64.1 ± 24.6		52.7 ± 16.1		57.1 ± 28.8	
XDR-TB	30 (31.6)	58.8 ± 17.3		59.0 ± 19.5		65.6 ± 16.2		62.5 ± 14.5		68.3 ± 23.6	
Extremely drug-resistant TB	14 (14.7)	60.0 ± 18.0		58.3 ± 16.6		67.9 ± 24.8		59.6 ± 19.2		62.5 ± 27.3	
Phase of treatment											
Intensive	61 (64.2)	57.7 ± 14.8	0.26	53.6 ± 17.6	0.14	69.4 ± 18.1	0.83	58.2 ± 16.0	0.12	62.3 ± 26.1	0.26
Continuation	27 (28.4)	55.9 ± 14.8		62.0 ± 17.5		69.9 ± 22.5		65.6 ± 13.7		70.4 ± 15.6	
Completed	7 (7.4)	48.0 ± 17.6		56.9 ± 24.6		57.1 ± 36.5		57.6 ± 20.2		71.4 ± 33.6	

* Statistically significant.

WHOQoL-BREF = World Health Organization's Quality of Life Brief Questionnaire; SD = standard deviation; PTB = pulmonary tuberculosis; EPTB = extra-pulmonary TB; MDR-TB = multidrug-resistant TB; XDR-TB = extensively drug-resistant TB.

Table 3 Characteristics of participants included in the qualitative phase and their scores

No	Age years	Sex	TB resistance pattern	TB site	Health facility	Physical domain	Psychological domain	Social relations domain	Environmental domain
1	24	Female	MDR-TB	Pulmonary	Jupiter Hospital	53.6	66.7	75.0	62.5
2	23	Female	Extremely DR-TB	Pulmonary	MSF Clinic	67.9	33.3	37.5	15.6
3	30	Male	MDR-TB	Extra-pulmonary	Jupiter Hospital	60.7	50.0	75.0	62.5
4	30	Female	MDR-TB	Pulmonary	Jupiter Hospital	39.3	62.5	83.3	75.0
5	29	Female	Pre-XDR-TB	Pulmonary	MSF Clinic	60.7	54.2	100	93.7
6	55	Male	Pre-XDR-TB	Pulmonary	MSF Clinic	46.4	54.2	50.0	62.5
7	52	Female	MDR-TB	Pulmonary	Jupiter Hospital	46.4	66.7	100	56.2
8	29	Female	MDR-TB	Extra-pulmonary	Jupiter Hospital	46.4	54.2	75.0	53.1
9	29	Male	XDR-TB	Pulmonary	Jupiter Hospital	64.3	79.2	75.0	84.4
10	30	Female	Pre-XDR-TB	Pulmonary	MSF Clinic	46.4	37.5	37.5	50.0
11	24	Male	Extremely DR-TB	Pulmonary	MSF Clinic	60.7	75.0	91.7	65.6
12	32	Male	Pre-XDR-TB	Pulmonary	MSF Clinic	60.7	37.5	50.0	35.7

TB = tuberculosis; DR-TB = drug-resistant TB; MDR-TB = multidrug-resistant TB; XDR-TB = extensively drug-resistant TB.

ingrained in their minds. Self-image deteriorated further as participants were unable to fulfil their normal roles.

No participant wanted to disclose their status to more people than absolutely necessary due to the stigma associated with TB. However, explicit discrimination was uncommon. Participants reported that their entire life had been affected by the very long and uncertain treatment for DR-TB.

I have asked my husband to remarry and not to expect anything from me. (29 years, female)

Hopes for self, career and children had to be abandoned, to be replaced by the hope that life would not get worse. Spirituality and belief in God gave strength to complete the arduous treatment course. Most reported that they felt close to a spiritual power that motivated them in this difficult phase of their life.

One participant mentioned that TB slowed his life

down but gave him time to reflect and be more mindful:

It (TB) helped me in a way to sit down and think and ponder over things...earlier it was more of quantity, (but) now it's more about quality of my life. (30 years, male)

Physical health domain

Physical health was the second most affected domain, with a mean score of 56.5 (SD ± 18). In the unadjusted analysis, age was significantly associated with physical health scores; participants from older age groups reported lower physical health. In-depth interviews revealed that before starting treatment, physical problems were overpowering participants; they could not perform even simple activities such as walking. One mentioned that he ‘stopped talking’, as it would lead to increased coughing.

Physical problems, including generalised weakness

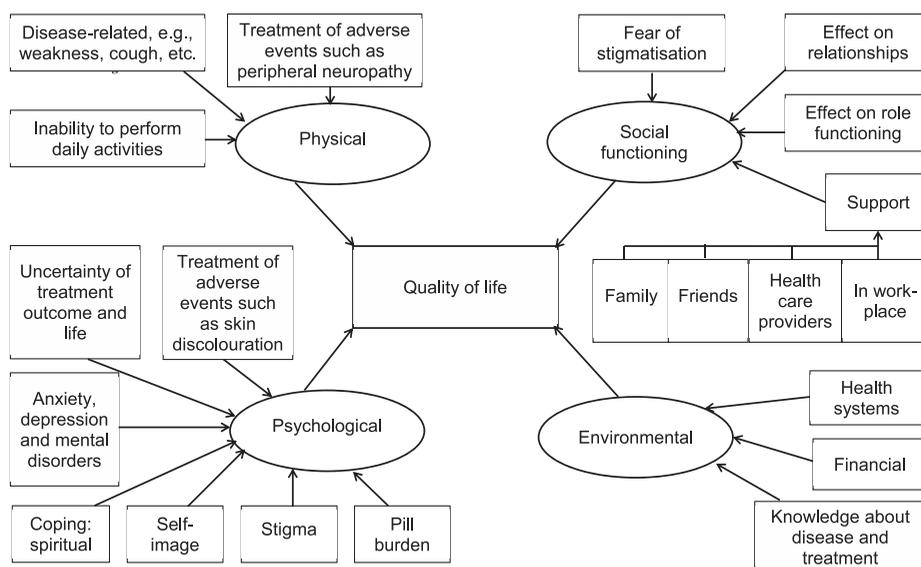


Figure Thematic network analysis of health-related quality of life among multidrug-resistant tuberculosis patients at the MSF Clinic and Jupiter Hospital in Mumbai, India. MSF = Médecins Sans Frontières.

and treatment side effects, precluded participants from performing day-to-day and leisure activities. Side effects included severe headaches, nausea, injection-site inflammation, vomiting and walking problems due to numbness or pain in their legs. On a positive note, participants mentioned that they started to live a healthier lifestyle, and improved their dietary habits post-diagnosis. One quit tobacco, which he had been chewing for decades.

Social life and role functioning

The mean social relations domain score was 68.6 (SD ± 21.1). The social relations domain was most significantly associated with TB-induced occupation change: participants who had to stop working due to TB scored significantly lower (by 16 points) than those able to continue their work (Table 2). It was also significantly associated with sex (males reported lower scores) and health facility (participants from the MSF Clinic reported lower scores).

Participants reported reduced participation in social life due to lack of energy, which disturbed them. The effect of treatment led beyond the physical to self-imposed psychological and social isolation.

Role functioning was hampered. Participants were unable to play their part in their family or society as they had hoped, making them feel inadequate. One participant mentioned that she had 'failed as a daughter and elder sister' (23 years, female).

Both men and women were unable to spend time with their children. One participant said,

She (daughter, age 4 years) always asks me, 'Mummy, when you go to the doctor ask him if you can play with me now'... She wakes up in the middle of the night and starts crying, saying 'I want to go to my mummy'. (29 years, female)

This led to further self-blame, affecting her QoL even more.

Relationships between families were affected by TB. One participant reported that her in-laws were blaming her parents for not informing them about her earlier TB episode. This rift affected her ability to take treatment regularly. Another disclosed that:

It feels like all relationships have been spoilt. And it's not just me; everyone around me suffers as much as I do due to this illness. I feel like running away from home. (29 years, female)

Participants reported that eventually, after an initial downturn, they tried to cope and continue treatment. Support, mainly psychological and emotional, helped them overcome their negativity about taking treatment. In most cases, support came from family or close friends. Family support, especially from the spouse, children and/or parents, was very important in motivating them to continue with their treatment despite the numerous hurdles. Support was

a source of strength. Where family support was not perceived to be enough, a very poor QoL was experienced.

Support from health care providers was also perceived as extremely important. Psychological support in the form of counselling and psychiatric support was important.

Two years is a long time. I was afraid of the side effects. Counselling helped me overcome this. (30 years, female)

However, there were some who felt that they were not 'weak', and thus did not need counselling.

Support in the workplace, especially from the immediate supervisor, was also considered very important. This led to participants being able to continue their work, which gave them a feeling of being useful and increased their motivation. It also helped as a distraction from their daily misery. Breaks in education and work due to TB led to frustration and reduced QoL.

If a participant was able to assume the role of a supporter, they coped better with their own illness. As a coping mechanism, one participant said:

Helping others with their problems helped me. I get courage from that. (52 years, female)

Environmental domain

The mean environmental domain score was 65.3 (SD ± 24.3). The environmental domain was significantly associated with TB-induced occupation change (participants who had lost work reported lower scores), the health facility (participants from the MSF Clinic reported lower scores) and the resistance pattern of TB (pre-XDR-TB participants, i.e., MDR-TB patients with resistance to either a fluoroquinolone or a second-line injectable, reported the lowest scores).

Health systems factors, such as the quality of care and support received from health care providers, affected the participants' perception of their QoL. Most had previously taken treatment at government DOTS centres. However, participants were stressed because direct observation was impossible as it interfered with their employment and personal lives. One of the participants (24 years, female), a medical doctor and MDR-TB patient, suggested that fixed number of doses should be given to patients to help them continue their treatment and reduce their financial burden.

Another participant blamed the type of treatment he received from the staff at some public health facilities as a major reason for the poor QoL.

Doctors would not even touch me or talk directly with me at times. I was made to sit far away from the doctor's desk. I felt...untouchable. When I came here, the doctor kept his hand on my

shoulder and assured me that I would get better and I felt that I was half cured. (55 years, male)

Some reported that financial burden affected their QoL, either directly or indirectly. One mentioned that her family had to mortgage her gold jewellery to finance her TB treatment.

Knowledge about the disease and treatment was mentioned as being important to help come to terms with the disease and the difficult treatment journey. Some of the more educated participants reported using the internet to read about TB and treatment outcomes. However, this had mixed results. While some acquired better understanding about their treatment and were able to monitor their side effects, one participant said:

I used to Google, which used to give me more stress. (30 years, female)

She calmed down only when her treating physician sat down with her to explain her treatment and allay her doubts.

DISCUSSION

HRQoL among MDR-TB patients was reduced, as measured by a validated instrument (WHOQoL-BREF): the psychological domain was most affected, closely followed by the physical domain. Qualitative data showed the importance of support during the demanding treatment for DR-TB, whether from family and friends, health care professionals or in the workplace.

Despite the reduction in QoL, scores were not as low as previously reported among TB patients in the public sector in India and elsewhere.^{8,12,32} Aggarwal et al. reported domain scores of respectively 45.3, 49.3, 59.0 and 50.5 for physical, psychological, social and environmental domains among DS-TB patients.³²

Questionnaire findings around the importance of support were developed through the interviews. They showed that support from health care providers, family and in the workplace had a very important positive influence on QoL. Although patients struggled during the course of this gruelling treatment, support made a difference. Social support and psychological influences have been recognised as being important for patients with TB for centuries.³³ QoL was affected by the quality of care that TB patients received;³⁴ we hypothesise that the good quality of care and support that participants in our study received during their treatment led to higher WHOQoL-BREF scores than those reported in earlier studies.

Among subgroups, we found some noteworthy results: the TB resistance pattern did not make a difference in HRQoL in our cohort. Unexpectedly,

the phase of treatment, whether intensive or continuation, did not show a significant effect, although this may have been due to the cross-sectional nature of our study. It would be interesting to follow a cohort of patients through the two treatment phases. During in-depth interviews, participants reported an improvement in their QoL as treatment progressed. However, it was not clear if that was due to treatment progression or due to psychological adjustments made by participants to their treatment and disease.

Among the significant differences found, we observed that participants who had to quit their jobs due to TB had poorer social relations scores than those who could continue working.

The pill burden was a significant factor affecting the QoL in all participants. The number of pills needed to be taken hindered work and leisure time, as did extended periods of injections, which required the patient to see a health care provider daily. Likewise, drug side effects took a toll, not only on the physical, but also on the psychological aspects of the participant's life.

There were significant differences in WHOQoL-BREF scores between participants from the MSF Clinic and Jupiter Hospital. Positive effects of TB on HRQoL were reported almost exclusively by the socio-economically well-off participants in Jupiter Hospital. None of the participants at the MSF Clinic, who were mostly from lower socio-economic strata, reported any kind of positive effect on their life from TB. It therefore appears that there is a relationship between the perception of QoL and socio-economic status. However, we were not able to verify this quantitatively due to missing data on income, as most participants did not provide this information.

We believe this is a strong study, as it fulfils all but two of Brown et al.'s criteria for an ideal QoL study on TB.¹² We used a general QoL tool, validated for the study population. We report QoL among a subgroup of TB patients with complex resistance patterns, some of whom were taking the new drugs, bedaquiline or delamanid. However, we did not use a longitudinal method or measure residual impairment after completion of treatment, which were limitations. Another limitation was that the study population came from settings catering to specific subpopulations. Further studies should explore the associations of HRQoL with socio-economic status, quality of care in a routine programmatic setting, and support and coping mechanisms among various populations, especially the poor.

We have shown the importance of support during the onerous treatment of DR-TB. All TB care programmes need structures and mechanisms to provide support to patients during treatment. Counsellors should be integral to such care, but clinical staff should not neglect this aspect during consultations. Counselling training for doctors and paramed-

ical staff working in TB projects would help them undertake this task. Family members should be included in all phases of treatment, as they are the primary supporters of the patient. There is an urgent need to humanise TB care, and patients should be treated with dignity at health care facilities, as this was a major demoralising factor. Patient-friendly treatment regimens for DR-TB that are injectable-free, with shorter treatment duration and less toxicity in the short and long term, are needed to reduce the pill burden. The WHO recommendation to promote a shorter (9–12 month) regimen for MDR-TB patients is a step in the right direction.³⁵

CONCLUSION

HRQoL among MDR-TB patients was reduced. We believe that TB patients who receive good standards of patient-centred care, who are empowered and knowledgeable about their disease, and who receive comprehensive care and support from family, workplace and the health system, can have a reasonable QoL despite the considerable challenges imposed upon them by the disease and treatment.

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References

- World Health Organization. Global tuberculosis report, 2015. WHO/HTM/TB/2015.22. Geneva, Switzerland: WHO, 2015.
- World Health Organization. Global tuberculosis report, 2016. WHO/HTM/TB/2016.13. Geneva, Switzerland: WHO, 2016. <http://apps.who.int/iris/bitstream/10665/250441/1/9789241565394-eng.pdf?ua=1> Accessed December 2018.
- Aggarwal A N. Health-related quality of life: a neglected aspect of pulmonary tuberculosis. *Lung India* 2010; 27: 1–3.
- Duraisamy K, Mrithyunjayan S, Ghosh S, et al. Does alcohol consumption during multidrug-resistant tuberculosis treatment affect outcome? A population-based study in Kerala, India. *Ann Am Thorac Soc* 2014; 11: 712–715.
- McKenna S P. Measuring patient-reported outcomes: moving beyond misplaced common sense to hard science. *BMC Med* 2011; 9: 86.
- McDowell I. *Measuring health: a guide to rating scales*. 3rd ed. New York, NY, USA: Oxford University Press, 2006.
- Hennessy C H, Moriarty D G, Zack M M, Scherr P A, Brackbill R. Measuring health-related quality of life for public health surveillance. *Public Health Rep* 1994; 109: 665–672.
- Guo N, Marra F, Marra C a. Measuring health-related quality of life in tuberculosis: a systematic review. *Health Qual Life Outcomes* 2009; 7: 14.
- Guyatt G H, Feeny D H, Patrick D L. Measuring health-related quality of life. *Ann Intern Med* 1993; 118: 622–629.
- Conrad P, Barker K K. The social construction of illness: key insights and policy implications. *J Health Soc Behav* 2010; 51 (Suppl): S67–S79.
- Hansel N N, Wu A W, Chang B, Diette G B. Quality of life in tuberculosis: patient and provider perspectives. *Qual Life Res* 2004; 13: 639–652.
- Brown J, Capocci S, Smith C, Morris S, Abubakar I, Lipman M. Health status and quality of life in tuberculosis. *Int J Infect Dis* 2015; 32: 68–75.
- Bauer M, Leavens A, Schwartzman K. A systematic review and meta-analysis of the impact of tuberculosis on health-related quality of life. *Qual Life Res* 2013; 22: 2213–2235.
- Dhuria M, Sharma N, Pal Singh N, Jiloha R C, Saha R, Ingle G K. A study of the impact of tuberculosis on the quality of life and the effect after treatment with DOTS. *Asia Pacific J Public Health* 2009; 21: 312–320.
- Pasipanodya J G, Miller T L, Vecino M, et al. Using the St George Respiratory Questionnaire to ascertain health quality in persons with treated pulmonary tuberculosis. *Chest* 2007; 132: 1591–1598.
- Muniyandi M, Ramachandran R, Balasubramanian R, Narayanan P R. Socio-economic dimensions of tuberculosis control: review of studies over two decades from Tuberculosis Research Center. *J Commun Dis* 2006; 38: 204–215.
- Singla N, Singla R, Fernandes S, Behera D. Post-treatment sequelae of multi-drug-resistant tuberculosis patients. *Indian J Tuberc* 2009; 56: 206–212.
- Ralph A P, Kenangalem E, Waramori G, et al. High morbidity during treatment and residual pulmonary disability in pulmonary tuberculosis: under-recognised phenomena. *PLOS ONE* 2013; 8: e80302.
- Godoy M D, Mello F C, Lopes A J, et al. The functional assessment of patients with pulmonary multidrug-resistant tuberculosis. *Respir Care* 2012; 57: 1949–1954.
- Sharma R, Yadav R, Sharma M, Saini V, Koushal V. Quality of life of multi drug-resistant tuberculosis patients: a study of North India. *Acta Med Iran* 2014; 52: 448–453.
- Johnson R B, Anthony J, Onwuegbuzie, Turner L A. Toward a definition of mixed methods research. *J Mix Methods Res* 2007; 1: 112–133.
- Office of the Registrar General and Census Commissioner. Mumbai (Greater Mumbai) City population census 2011. New Delhi, India. <http://www.census2011.co.in/census/city/365-mumbai.html> Accessed September 2018.
- Mistry N, Tolani M, Osrin D. Drug-resistant tuberculosis in Mumbai, India: an agenda for operations research. *Oper Res Health Care* 2012; 1: 45–53.
- Dsouza D T B, Mistry N F, Vira T S, et al. High levels of multidrug-resistant tuberculosis in new and treatment-failure patients from the Revised National Tuberculosis Control Programme in an urban metropolis (Mumbai) in Western India. *BMC Public Health* 2009; 9: 211.

- 25 Isaakidis P, Das M, Kumar A M V, et al. Alarming levels of drug-resistant tuberculosis in HIV-infected patients in Metropolitan Mumbai, India. *PLOS ONE* 2014; 9: e110461.
- 26 Isaakidis P, Cox H S, Varghese B, et al. Ambulatory multidrug-resistant tuberculosis treatment outcomes in a cohort of HIV-infected patients in a slum setting in Mumbai, India. *PLOS ONE* 2011; 6: 1–9.
- 27 Skevington S M, Lotfy M, O’Connell K A. The World Health Organization’s WHOqol-BREF quality of life assessment: Psychometric properties and results of the international field trial. A report from the WHOqol Group. *Qual Life Res* 2004; 13: 299–310.
- 28 Saxena S, Chandiramani K, Bhargava R. WHOQOL-Hindi: a questionnaire for assessing quality of life in health care settings in India. *World Health Organization Quality of Life. Natl Med J India* 1998; 11: 160–165.
- 29 Guest G, Bunce A, Johnson L. How many interviews are enough? *Field methods* 2006; 18: 59–82.
- 30 Attride-Stirling J. Thematic networks: an analytic tool for qualitative research. *Qual Res* 2001; 1: 385–405.
- 31 Tong A, Sainsbury P, Craig J. Consolidated criterion for reporting qualitative research (COREQ): a 32-item checklist for interviews and focus group. *Int J Qual Health Care* 2007; 19: 349–357.
- 32 Aggarwal A N, Gupta D, Janmeja A K, Jindal S K. Assessment of health-related quality of life in patients with pulmonary tuberculosis under programme conditions. *Int J Tuberc Lung Dis* 2013; 17: 947–953.
- 33 Murray J F, Rieder H L, Finley-Crowwhite A. The king’s evil and the royal touch: the medical history of scrofula. *Int J Tuberc Lung Dis* 2016; 20: 713–716.
- 34 Pai M, Behr M A, Dowdy D, et al. Tuberculosis. *Nat Rev Dis Primers* 2016; 2: 16076.
- 35 World Health Organization. WHO treatment guidelines for drug-resistant tuberculosis. WHO/HTM/TB/2016.04. Geneva, Switzerland: WHO, 2016.

R É S U M É

CONTEXTE : Deux sites pour le traitement de la tuberculose pharmacorésistante (TB-DR) à Mumbai, Inde (Centre MSF ; Jupiter Hospital).

OBJECTIF : Evaluer la qualité de vie liée à la santé (HRQoL) et les facteurs associés parmi les patients atteints de TB-DR et explorer leurs perspectives relatives à la HRQoL.

SCHEMA : Nous avons utilisé un schéma à méthodes mixtes : un questionnaire quantitatif transversal (Quality of life-brief questionnaire de l'Organisation Mondiale de la Santé [WHOQoL-BREF]) ; et des entretiens qualitatifs approfondis avec des patients choisis dans ce but. Les évaluations ont été réalisées entre avril et novembre 2016.

RÉSULTATS : Quatre-vingt-quinze patients ont rempli le WHOQoL-BREF ; 12 ont été interviewés. Les domaines de la santé psychologique et physique ont été les plus affectés (scores moyens $56,2 \pm$ déviation standard [SD] $18,3$ et $56,5 \pm$ SD $15,1$, respectivement ; maximum 100).

Les scores moyens en matière de relations sociales et d'environnement ont été de $68,6$ (SD $\pm 21,1$) et de $60,3$ (SD $\pm 15,9$), respectivement. La perte d'emploi due à la TB a affecté négativement les domaines des relations sociales et de l'environnement. Une analyse qualitative a montré que le soutien a été le thème le plus important affectant la qualité de vie. Les autres thèmes ont inclus des facteurs physiques (par exemple, les effets secondaires du traitement), des facteurs psychologiques (par exemple, la dépression), le fonctionnement social (par exemple, la peur de la stigmatisation), les facteurs d'environnement (par exemple, les systèmes de santé) et le poids de la prise du traitement.

CONCLUSION : La HRQoL a été plus faible parmi les participants de l'étude, mais pas aussi faible que cela avait été rapporté auparavant parmi les patients TB. Le soutien a été le facteur principal qui a positivement affecté la HRQoL en dépit du fait qu'à la fois la maladie et le traitement ont constitué un défi physique et social.

R E S U M E N

MARCO DE REFERENCIA: Dos centros de tratamiento de tuberculosis farmacorresistente (TB-DR) de Bombay, en la India (un consultorio de *Médecins Sans Frontières* y el *Jupiter Hospital*).

OBJETIVO: Evaluar la calidad de vida relacionada con la salud (HRQoL) y los factores que la modifican, en los pacientes con TB-DR y explorar los puntos de vista de estas personas con respecto a la HRQoL.

MÉTODO: Se aplicó una estrategia de métodos mixtos, con un cuestionario cuantitativo transversal (el cuestionario WHOQoL-BREF, que es una escala de la Organización Mundial de la Salud que mide la calidad de vida) y entrevistas exhaustivas cualitativas en pacientes escogidos intencionalmente. Las evaluaciones se llevaron a cabo de abril a noviembre del 2016.

RESULTADOS: Noventa y nueve pacientes completaron el WHOQoL-BREF y 12 respondieron a las entrevistas. Las dimensiones más afectadas fueron la esfera psicosocial (puntuación promedio, $56,2 \pm$ desviación estándar [SD] $18,3$) y la salud física ($56,5 \pm$ SD $15,1$; máximo de 100). La puntuación promedio en la

dimensión de relaciones sociales fue $68,6$ (SD $\pm 21,1$) y en la ambiental fue $60,3$ (SD $\pm 15,9$). La pérdida del trabajo por causa de la TB tuvo un efecto adverso en los dominios de las relaciones sociales y el ambiental. El análisis cualitativo reveló que el apoyo era el tema más importante que afectaba la calidad de vida. Otros temas destacados fueron factores físicos (por ejemplo, reacciones adversas al tratamiento), psicológicos (como la depresión), de funcionamiento social (por ejemplo, el temor a la estigmatización), factores ambientales (por ejemplo, el sistema de salud) y la cantidad de comprimidos para tomar.

CONCLUSIÓN: La puntuación de la HRQoL estaba disminuida en los participantes al estudio, pero no era tan baja como se ha comunicado en estudios anteriores de pacientes con TB. El principal factor que influyó de manera positiva en el resultado de la encuesta de la HRQoL fue el apoyo, pese a que tanto la enfermedad como el tratamiento eran problemáticos desde el punto de vista físico y social.