Effect of Yogic Breathing Techniques in New Sputum Positive Pulmonary Tuberculosis

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ABSTRACT

A 24-year-old, unmarried woman diagnosed of pulmonary tuberculosis (PTB) visited our hospital out-patient department in the month of August-2013. Patient came with the complaint of sever cough with expectoration; evening raise of temperature; gradual loss of appetite and weight since 2-weeks. We referred the patient to our hospital's Revised National Tuberculosis Program, direct observed treatment short-course center for sputum fluorescence microscopic examination (FME). FME report suggested the new smear positive, 2+ PTB. Our patient received yogic breathing techniques (YBT) for 45-min daily under the supervision for three alternate-days/week with anti-tuberculosis treatment (ATT) for the period of 8-weeks. After intervention our result showed better improvement in weight gain, body mass index, symptom scores, pulmonary function and health related quality of life with conversion of positive to negative FME for acid fast bacilli. It suggests YBT with ATT are effective in treating PTB and further studies required to warrant this effect.

Keywords: Anti-tuberculosis treatment, pulmonary tuberculosis, yogic breathing techniques

Case Report

INTRODUCTION

Tuberculosis is one of the major cause of morbidity and mortality throughout the world, especially in developing country[1] like India. An estimated tuberculosis patients are 1.96-million/year and among them 0.8-million are new smear positive (NSP) cases with 0.33-million deaths/year, i.e., 1000 deaths/day (two deaths/every 3-min) making it the highest tuberculosis burden country in the world.[2]

There are many studies deals with effect of various breathing techniques (BT)/pranayama on bronchial asthma,[3] but none of the studies reported the effect of only yogic breathing techniques (YBT) in patient with pulmonary tuberculosis (PTB) made us to select this present study with the aims and objective to evaluate the effect of YBT in patient with NSP PTB on body weight, body mass index (BMI), symptom score, pulmonary function (PF), sputum-fluorescence microscopic examination (FME) and health related quality of life (HRQL).

CASE REPORT

The present case is about a 24-year-old, unmarried woman diagnosed of PTB visited our hospital out-patient department in the month of August-2013. She came with the complaint of sever cough with expectoration; evening raise of temperature; gradual weight loss; and loss of appetite since 2-week. We referred the patient to our hospital's Revised National Tuberculosis Program, direct observed treatment short-course center for sputum-FME. FME report suggested the NSP, 2+ PTB. Institutional ethics committee of our college of medical sciences and hospital approved the study protocol and written informed consent form was obtained from the subject.

INTERVENTION

Patient received YBT for 45-min a day for 3 days/week with anti-tuberculosis treatment (ATT). The ATT intensive phase drugs and YBT used in our study were explained in Table 1.

ASSESSMENTS

Weight (once a week): Using standard weighing machine, weight in kilogram was measured.

BMI (once a week): It derived by using the formula of weight in kg/height in m^2.

Symptom scores (once a week): This is based on TB symptoms, i.e., cough, expectoration, hemoptysis, chest, fever, weakness, anorexia and insomnia. Each symptom carries 4 options which includes (1) absent (symptom is not present) =0, (2) mild (symptoms present but no inconvenience) =1, (3) moderate (symptoms present with inconvenience but no disruptions in normal routine) =2, (4) severe (symptoms present with disruptions in normal routine) =3. Total score range from 0 to 24 where 0 indicate no symptoms and 24 indicate severe symptoms.[4]

Spirometry (before and after 8-weeks): Following spirometric measures were assessed by computerized spirometric equipment (SCHILLER SPIROVIT-SP1); slow vital capacity (SVC), forced vital capacity (FVC) and forced expired volume in 1-s (FEV_1) expressed in litter; FEV_1/SVC

Table 1: ATT and YBT used in our study

ATT	YBT	Procedure	Duration
Rifampicin (450-mg)	OM chanting	It involves slow and deep inhalation followed by produce (chant) the sound OM till the end of exhalation in sukhasana (ease pose)[3]	5-min
Isoniazide (600-mg)	Hand stretch breathing	It involves raising both hands in front of chest, at shoulder level with palms facing each other. Stretch the hands from inside to outside while inhalation and contract the hands to the normal position while exhalation[4]	10-min
		It involves raising both hands side wards and upwards till close to ear while inhalation followed by put the hands down while exhalation	
		It involves keeping the hands in front of thigh and raise the hands upwards till close to ear while inhalation followed by put the hands down while exhalation	
Ethambutol (1200-mg)	Cat stretch breathing	It involves kneeling down on floor and keeping the palms in front of corresponding knees 2 feet apart with head flexed position. Raise the head backward and push the back downwards while inhaling followed by flex the head and push the back upwards while exhaling	5-min
Pyrazinamide (1500-mg)	Bhastrika pranayama (bellows breath)	It involves breath in and out forcefully and rapidly as much as possible in sukhasana[5]	5-min
	Alternate nostril breathing	It involves breath in through left nostril followed by breath out through right nostril and vice-versa in sukhasana[3]	10-min
	Relaxation	It involves relaxation in savasana (corpse pose)[4]	5-min

Dose: 3 dose/week for 8-weeks (each dose was given on Monday, Wednesday and Friday respectively-1 min of relaxation was given in between all the practices (i) time of practice: Around 8.30-am to 10.00-am, (ii) duration of practice: 45-min/day, (iii) period of practice: 3 days (Monday, Wednesday and Friday)/week for 8-weeks (similar like ATT dose) ATT=Anti-tuberculosis treatment, YBT=Yogic breathing techniques

Table 2: Baseline and post-assessment values

Parameter	Baseline		Post-test			
Weight (kg)	44	1-4 weeks	45	46	46	47
		5-8 weeks	47	49	50	50
BMI (kg/m^2)	17.62	1-4 weeks	18.03	18.42	18.42	18.82
		5-8 weeks	18.82	19.62	20.02	20.02
Symptom scores						
Cough	3	1-4 weeks	2	0	1	0
		5-8 weeks	0	0	0	1
Expectoration	2	1-4 weeks	1	1	1	0
		5-8 weeks	1	0	0	0
Hemoptysis	0	1-4 weeks	0	0	0	0
		5-8 weeks	0	0	0	0
Chest pain	1	1-4 weeks	0	0	0	0
		5-8 weeks	0	0	0	0
Fever	2	1-4 weeks	0	0	0	0
		5-8 weeks	0	0	0	0
Weakness	3	1-4 weeks	1	0	1	1
		5-8 weeks	0	0	1	0
Anorexia	1	1-4 weeks	0	0	0	0
		5-8 weeks	0	0	0	0
Insomnia	1	1-4 weeks	1	1	0	0
		5-8 weeks	0	0	0	0
Total score	13	1-4 weeks	5	2	3	1
		5-8 weeks	1	0	1	1
After 8-weeks						
SVC(l)	1.83	1.95				
FVC(l)	1.92	1.98				
FEV_1(l)	1.90	1.98				
FEV_1/SVC(%)	103.6	101.5				
PEF(l/s)	2.98	4.51				
$FEF_{25\%}$(l/s)	2.88	4.46				
$FEF_{50\%}$(l/s)	2.91	3.86				
$FEF_{75\%}$(l/s)	2.00	2.09				
$FEF_{25-75\%}$(l/s)	2.70	3.56				
FME						
Smear-1	Positive, 2+	Negative				
Smear-2	Positive, 2+	Negative				
SF-12 health survey						
PCS	36.4	57.5				
MCS	29.7	52.1				

BMI=Body mass index, SVC=Slow vital capacity, FVC=Forced vital capacity, FEV_1=Forced expired volume in 1-s, PEF=Peak expiratory flow, FEF=Forced expiratory flow, FME=Florescent microscopic examination, SF-12=Short form-12, PCS=Physical component summery, MCS=Mental component summery

expressed in percentage; forced expiratory flow rate, i.e., $FEF_{25\%}$, $FEF_{50\%}$, $FEF_{75\%}$ and $FEF_{25-75\%}$ and peak expiratory flow (PEF) expressed in litter/second. The SVC, FVC maneuvers were repeated at least thrice during each measurement and the highest of three acceptable readings were taken as the final values of that sitting.[6]

Sputum-FME (before and after 8-weeks): Two sputum samples were examined with the use of light emitting diode fluorescence microscope by using

auromine O staining method. Result and its grading: Negative = 0 – acid fast bacilli (AFB)/100-high power fields (HPF); Scanty = 1-9 AFB/100-HPF; 1+=10-99 AFB/100-HPF; 2+=1-10AFB/1-HPF; 3+= >10-AFB/1-HPF.[7]

HRQL (before and after 8-weeks): SF-12 questionnaire was used to assess the HRQL. It is a tool of choice that is able to produce two summary scales (physical, mental health state) which are shortened from SF-36 with accuracy.[8]

RESULTS

Our result showed improvement in weight gain, BMI, symptoms score, spirometric variables such as SVC; FVC; FEV1; PEF; FEF25%; FEF50%; FEF75% and FEF25-75% with conversion of positive to negative sputum-FME in our patient [Table 2].

DISCUSSION

BT used in yogic practices shown to improve PF.[5] Improvement in PF after YBT with ATT is a good prognosis of diseases because extensive parenchymal and pleural involvement in PTB leads to residual fibrotic changes with reduced vital capacity and other lung volumes.[4] Treated cases can leads to some complications including progressive loss of PF, persistent pulmonary symptoms etc.[9] A systematic review showed the positive association between past history of tuberculosis and presence of chronic airflow obstruction, which is independent of cigarette smoking.[10]

Adverse effects of medication, prolonged treatment duration, some cultures and social stigma etc., may diminished HRQL of patients with tuberculosis.[11] Increase in SF-12 health survey score in our patient indicates better HRQL and it may attribute to reduction of adverse effect of medication and improvement in emotional stability. The conversion of positive to negative sputum-FME may attribute to increased immunity by reduced stress level because yogic practices are known to reduce stress, which can reduce vulnerability to infections.[4]

Previous study on yoga for PTB showed better weight gain, symptomatic relief, increased lung capacity and better sputum conversion during the intensive phase of ATT supporting our study.[4] The study duration restricted to the intensive phase of ATT is limiting the scope but better improvement in disease prognosis within the same duration will give hope for the patient undergoing ATT, which may useful for the better control of PTB.

CONCLUSIONS

The result of our study suggests YBT with ATT are effective in treating PTB. Further studies are required in a large scale to warrant this effect.

REFERENCES

1. Jeong YJ, Lee KS. Pulmonary tuberculosis: Up-to-date imaging and management. AJR Am J Roentgenol 2008;191:834-44.
2. Nagaraja C, Shashibhushan BL, Sagar C, Asif M, Manjunath PH. Resistance pattern in drug-resistant pulmonary tuberculosis. J Postgrad Med 2011;57:181-3.
3. Saxena T, Saxena M. The effect of various breathing exercises (pranayama) in patients with bronchial asthma of mild to moderate severity. Int J Yoga 2009;2:22-5.
4. Visweswaraiah NK, Telles S. Randomized trial of yoga as a complementary therapy for pulmonary tuberculosis. Respirology 2004;9:96-101.
5. Patil YR, Sawant RS. Effect of bastrika pranayama on pulmonary function. Int J Pharm 2012;3:204-7.
6. Vempati R, Bijlani RL, Deepak KK. The efficacy of a comprehensive lifestyle modification programme based on yoga in the management of bronchial asthma: A randomized controlled trial. BMC Pulm Med 2009;9:37.
7. Bonnet M, Gagnidze L, Githui W, Guérin PJ, Bonte L, Varaine F, *et al*. Performance of LED-based fluorescence microscopy to diagnose tuberculosis in a peripheral health centre in Nairobi. PLoS One 2011;6:e17214.
8. Othman GQ, Ibrahim MIM, Raja'a YA. Health related quality of life of pulmonary and extra pulmonary tuberculosis patients in Yemen. Afr J Pharm Pharmacol 2011;5:547-53.
9. Denning DW, Pleuvry A, Cole DC. Global burden of chronic pulmonary aspergillosis as a sequel to pulmonary tuberculosis. Bull World Health Organ 2011;89:864-72.
10. Allwood BW, Myer L, Bateman ED. A systematic review of the association between pulmonary tuberculosis and the development of chronic airflow obstruction in adults. Respiration 2013;86:76-85.
11. Kittikraisak W, Kingkaew P, Teerawattananon Y, Yothasamut J, Natesuwan S, Manosuthi W, *et al*. Health related quality of life among patients with tuberculosis and HIV in Thailand. PLoS One 2012;7:e29775.

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