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INFLUENCE OF HONEY ON SPUTUM CONVERSION AMONG NEW SMEAR POSITIVE TUBERCULOSIS PATIENTS RECEIVING DOTS IN SOUTH DELHI, INDIA

Khayyam Khalid Umer[1*], Siddiqui Ali Nasir[2], Sharma Manju[3], Kumar Vinay[3], Sazina Muzammil[4]

[1] HOD Epidemiology and Public Health, National Institute of TB and Respiratory Diseases, New Delhi.

[2] Dept. of Pharmaceutical Medicine, Faculty of Pharmacy, Jamia Hamdard University, New Delhi.

[3] Dept. of Pharmacology, Faculty of Pharmacy, Jamia Hamdard University, New Delhi.

[4] Dept. of Dentistry, Jamia Millia Islamia University, New Delhi.

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***Correspondence For Author**
Dr. Khayyam Khalid Umer
HOD Epidemiology and Public Health, National Institute of TB and Respiratory diseases, New Delhi.

ABSTRACT

Objective: The aim of the present study is to assess the influence of honey on sputum conversion of newly diagnosed sputum acid-fast bacilli (AFB) positive Pulmonary Tuberculosis patients of category I receiving Directly Observed Treatment Short course (DOTS) under Revised National Tuberculosis Control Programme (RNTCP) at the end of two months treatment. Methods: In this study, a total of 185 new smear positive pulmonary tuberculosis patients registered at the DOT cum microscopy centers, New Delhi were divided into two groups. Group I (i.e. control) comprise of 83 patients, received standard ATT (anti- tubercular therapy) and group II (i.e. cases) comprise of 102 patients, received honey along with standard ATT. Treatment outcome was tested by examination of sputum status at the end of two months treatment. Results: Sputum conversion rate among patients of group II was (88%) as compare to the group I (96%) who received honey along with ATT. Honey along with ATT improves sputum conversion rate at the end of two months treatment (i.e. intensive phase) in AFB positive pulmonary tuberculosis patients of category I. Conclusion: Honey can be used as an adjuvant along with ATT in the treatment of pulmonary

tuberculosis patients receiving DOTS. The antimycobacterial effect of honey need to be further investigated.

KEYWORDS: Honey, Tuberculosis, DOTS, Sputum smear examination, Sputum smear conversion.

INTRODUCTION

Tuberculosis (TB) has been a major killer disease from several thousand years. Despite intensive efforts to combat the disease over the past twenty years, TB remains one of the leading causes of morbidity and mortality in many setting particularly in the world's poorest countries.[1]

Nutritional supplements are needed to assist in the body, regain strength and fight illness. Apitherapy or therapy with the bee products as honey is an old tradition. Honey has potent bactericidal activity against many pathogenic organisms.[2]

Avicenna, the great Iranian scientist and physician, almost 1000 years ago, had recommended honey as one of best remedies in the treatment of tuberculosis.[3] Honey has potent bactericidal activity against many pathogenic organisms including various gram positive and gram negative bacteria.[2,4,5] Growing or culturing *Mycobacterium tuberculosis* (MTB) from patients sample is gold standard for diagnosing TB. Sputum for acid-fast bacilli (AFB) is an approved simplest tool to diagnose and monitor the progress of pulmonary tuberculosis.[2, 6]

A mixture of honey and aged butter is said to be especially curative of TB transferred by cold temperatures. TB of the neck is treated with honey, milk and herbs.[7] Experimental studies have confirmed the potent antimycobacterial effect of honey. However, there are not any reports available regarding the effect of honey on mycobacteria in clinical condition. Therefore, this study has been designed to evaluate the possible use of honey as therapeutics in Indian pulmonary TB patients, receiving anti-tubercular (ATT) therapy under the revised national tuberculosis control program (RNTCP).

MATERIAL AND METHODS

A prospective study was performed on new pulmonary sputum acid-fast bacilli positive patients with tuberculosis registered under RNTCP for DOTS in three months (January to March 2007). Sputum smears were examined for AFB by Ziehl-Neelsen staining method. These patients were diagnosed at National Institute of TB and Respiratory Disease – RNTCP

microscopy centers. Sputum-smear results were classified as 1+, 2+, 3+, scanty or negative on the basis of national tuberculosis guidelines.[8] These patients had never received anti-tuberculosis treatment previously. A total of 185 patients were enrolled in this study, were divided into two groups (Group-I & Group-II) on basis of the treatment. Group-I served as control, consist of 83 patients, received *short course chemotherapy* as per RNTCP guidelines i.e. four drugs (*Isoniazid, Rifampicin, Pyrazinamide & Ethambutol*) thrice weekly for two months in the *intensive phase*. Group II served as case, consist of 102 patients, received *short course chemotherapy* as per RNTCP guidelines i.e. with four drugs (*Isoniazid, Rifampicin, Pyrazinamide & Ethambutol*) and honey (one teaspoonful i.e. 5 ml) of Wings Pharmaceuticals Pvt. Ltd., thrice weekly for two months in the *intensive phase*. Drugs administered to all patients as prescribed in DOTS under direct supervision of health worker/DOTS provider.

Table 1: Patients Detail

Age group	**Total number of Patients**	
	Control Group	**Case Group**
14-24	9	15
25-34	18	22
35-44	21	25
45-54	13	17
55-64	7	8
65	15	15
Total	83	102
		No. of Patients (%)
Sex	Male	131 (71%)
	Female	54 (29%)
Diet	Vegetarian	68 (37%)
	Non-vegetarian	117 (63%)
Addiction	Smokers	109 (59%)
	Non smokers	76 (41%)
Positivity	3 +	86 (46%)
	2 +	46 (25%)
	1+	53 (29%)

Patients with history of allergy to honey and / or related products were excluded from the study. Patients taking over the counter (OTC) drugs or drugs for co-morbidity (such as asthma, diabetes mellitus), pregnant women or women taking oral contraceptives and patients of pediatric age group were also excluded from the study.

TABLE 2: Sputum status in Cases (i.e. Group II, n = 102)

No. of Patients	Initial Sputum Status	Sputum status at 2 months for AFB	
		Patients smear (+)	Patients smear (-)
48	3 +	4	44
24	2 +	Nil	24
30	1 +	Nil	30
Total = 102		4 (3.92%)	98 (96.08%)

A signed written informed consent was taken from the patients prior to enrollment in the study. The study was initiated after the approval of the study protocol by Research and ethical Committee of National Institute of TB and Respiratory Disease, New Delhi.

TABLE 3: Sputum status in Controls (i.e. Group I, n = 83)

No. of Patients	Initial Sputum Status	Sputum status at 2 months for AFB	
		Patients smear (+)	Patients smear (-)
38	3 +	8	30
22	2 +	2	20
23	1 +	Nil	23
Total = 83		10 (12.05%)	73 (87.95%)

P> 0.05, the row/ column association is not statistically significant

Social information's such as age, sex, diet and addiction to smoking were also recorded. All patients were assessed at two months as per the RNTCP guidelines.[9, 10]

RESULTS AND DISCUSSION

Developing countries face a huge and increasing burden of TB. In spite, the implementation of innovative and cost effective DOTS strategy of the world health organization (WHO), treatment outcome is not so good. The reason is that all the anti-TB drugs are bitter in taste and produce many problems such as hepatic and gastric dysfunctions, many patients left their treatment course in between and results in the relapse or MDR cases. A total of 185 patients were enrolled in the study after a strict consideration of inclusion and exclusion criteria. Patient's detail was given in Table 1 which depicts the age group, gender distributions, diet, addictions and smears positivity details. Among the gender distribution, out of 185 patients; 131 (71%) were male and 54 (29%) were female and 86 (46.48%) patients were in the range of the age group 25-44 years. In this finding, of both groups, males are more affected with pulmonary TB. Chadha and Bhagi had also reported similar results where 67.6% males and 32.4% females were affected with pulmonary TB,[11] The dietary pattern in same 185 patients, 117(63%) patients were non-vegetarian, contributing more cases of tuberculosis as

compared to the vegetarian (37%). A high percentage of cases of tuberculosis were found in non-vegetarian as compared to vegetarian patients. This result indicates that non-vegetarian population is at higher risk of tuberculosis. In the same table, out of 185 TB patients, 109 (59%) patients were regular smokers as compared to the 76 (41%) non-smokers while none of the female patients smoked, Chadha and Bhagi reported;. [11] that smokers are at higher risk of developing pulmonary TB as compared to the non-smokers. Table 2 & 3 depict the distribution of the TB patients according to sputum status. Patients under this study were categorized as per grading of the sputum AFB smear. Among the total 185 patients the 3+, 2+ and 1+ were 86 (46%), 46 (25%) and 53 (29%) respectively. Among the total patients population, a high number of patients presented with 3+, followed by 2+ and 1+. Our results are in agreement with the reports in literature.[12]

Sputum conversion rates of all the patients among cases and controls group were assessed at the end of two months treatment. It was found that, sputum conversion rate at the end of two months treatment was high among patients with case group as compare to the patients of the control group. Among the cases (i.e. group II) a total of 102 patients were assessed at the end of two months; 98 (96.08%) patients were found to be sputum negative whereas 4 (3.92%) patients remain sputum positive. (Table 2), while in the controls (i.e. group I) a total of 83 patients were assessed at the end of two months; only 73 (87.95%) were found to be sputum negative whereas 10 (12.05%) patients remain positive (Table 3). Thus, honey along with ATT in cases after two months of intensive phase, converts 96% patients as compared to control 88% patients. Statistically significant differences in the sputum conversion rate at the end of two months treatment between two groups were seen. Honey with ATT improve sputum conversion rate at the end of two month treatment (i.e. intensive phase) in AFB positive pulmonary TB patients of category I. This may be because of reported antimicrobial activity of honey. Therefore honey can be considered as an adjuvant along with ATT in pulmonary TB patients receiving DOTS under RNTCP. This antimycobacterial effect of honey may be due to low water activity, acidity, glucose oxidase[13] and non-peroxides flavonoids (like pinocembrin).[14]

The data of this study at the end of two months treatment support the continuation of second and third sputum examinations in routine monitoring of treatment. The results of this study could be useful in conversion rates. The malabsorption is one of the reasons for poor sputum

smear conversion in control patients. Honey along with anti-TB drugs in cases, provides some nutrients which are required by the TB patients.

Honey has good antimycobacterial effect with minimum side effects if taken with anti-TB drugs as comparison to the antimycobacterial (anti-TB) chemotherapy alone. However, further research may be done by administration of honey along with anti-TB drugs throughout the treatment course in all categories of patients.

CONCLUSION

Honey can be used as an adjuvant along with ATT in the treatment of pulmonary tuberculosis patients receiving DOTS. The antimycobacterial effect of honey need to be further investigated.

ABBREVIATIONS

AFB**:** Acid-fast bacilli,

DOTS: Directly Observed Treatment Short course

RNTCP: Revised National Tuberculosis Control Programme

ATT: Anti- tubercular therapy

TB: Tuberculosis

MTB: *Mycobacterium tuberculosis*

OTC: Over the counter

WHO: World health organization

MDR: Multi drug resistance

ETHICAL CONSIDERATION

The study protocol was approved by Research and ethical Committee of National Institute of TB and Respiratory Disease, New Delhi

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CONFLICT OF INTEREST

The authors declare no conflict of interests.

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