ISSN 0974-3618 (Print)
0974-360X (Online)

www.rjptonline.org

RESEARCH ARTICLE

Role of Clinical Pharmacist in Improving Patients Compliance including Risk Factors among Tuberculosis Patients

Gandikota Thanmayi, P Shanmugasundaram*, P. Geetha
School of Pharmaceutical Sciences, Vels University (VISTAS), Chennai, Tamil Nadu, India.
*Corresponding Author E-mail: **samsimahe@gmail.com**

ABSTRACT:
Fifty four articles related to tuberculosis were found in a search through a database. Thirty three articles were selected and reviewed on the basis of clinical relevance and future implications. Medication compliance refers to whether patients take their medications as prescribed as well as whether they continue to take a prescribed medication. Medication non adherence is a growing concern to clinicians, healthcare systems, and other stakeholders because of mounting evidence that it is prevalent and associated with adverse outcomes and higher costs of care. The main objectives of the clinical pharmacist is to describe the pattern and monitoring the medication compliance of anti-tubercular used in patients and assess the knowledge among patients regarding their medications.

KEYWORDS: Tuberculosis, Clinical Pharmacist, Compliance.

INTRODUCTION:
Early Ayurvedic texts leave no doubt in anybody's mind that Tuberculosis existed in India since ancient times[1]. It remains a major global health problem causing ill-health among millions of people each year and ranks as the second leading cause of death from an infectious disease worldwide, after the Human Immunodeficiency Virus (HIV)[2].

As a disease of chronic evolution, Tuberculosis (TB) requires numerous health services and especially from health professionals, a great responsibility towards assuring patients' adherence to treatment and not endangering their own and the populations' lives with an increasing chance of contamination between contacts[3].Among the health care professionals, especially a clinical pharmacist, plays a vital role in encouraging the patient not to abandon the treatment and achieve a cure.

Received on 03.06.2017 Modified on 06.07.2017
Accepted on 16.07.2017
Research J. Pharm. and Tech. 2017; 10(9): 2945-2948.
DOI: 10.5958/0974-360X.2017.00521.2

Compliance is the extent at which the person's behaviour in terms of taking medication, following diets or executing life style changes coincides with the medical or health advisers.

The factors contributing to the non-compliance include patient's unresolved concerns, including diagnosis, absence of symptoms, time between drug and its effect, and the fear of adverse effects[4].

The factors related to low compliance include psychiatric disorders, and treatment factors, such as the duration of the treatment, the number of medications prescribed, the cost, and the frequency of dosing[4]. Patients compliance with therapy depends on many psychological and sociological factor including age, patients own idea regarding disease and level of education. Patient compliance is one of the most important factors that affect the outcome of the therapy[5].

Socioeconomic factors, such as poverty, poor access to health care services, crowded housing, poor nutrition, poor general health, smoking, and alcohol abuse, have been shown to be associated with tuberculosis[6]. The

major cause of non-compliance towards DOTS is less awareness that adherence with therapy is very important for complete cure. Other causes in descending order are as follows: big size of tablets , side effects of the drugs , and use of complementary and alternative medicines[7].

Non-compliance to therapy can cause drug resistance and also relapse of disease which leads to raise the burden of tuberculosis globally.

THE TUBERCULOSIS:

The microorganisms frequently penetrate into the lungs while breathing and are spread to the whole body by means of blood circulatory system, lymphatic system or direct extension to other organs in this infectious disease. Tuberculosis bacteria is spread into the air while contaminated person spits, talk, sneeze or cough[8,9].

Typical outward indications of pulmonary tuberculosis include weight reduction, coughing blood, occasional fever, persistant cough, and night sweats[10].Tuberculosis evolves in the human body in two phases. The first phase occurs when someone who is subjected to micro-organisms from a contagious case of tuberculosis becomes infected (tuberculosis infection), and the second is when the infected person grows the illness (tuberculosis)[11]. There may be high risk of becoming infected if the intensity of exposure to the bacteria is high and for a long time.

SIGNS AND SYMPTOMS:

When the disease becomes active, 75% of the cases are pulmonary tuberculosis that is TB in the lungs. Symptoms include chest pain, coughing up blood, and a productive, prolonged cough for than three weeks. Systemic symptoms include fever, chills, night sweats, weight loss, appetite loss, pallor and often a tendency to fatigue easily[12]. In other 25% of active cases, the infection moves from the lungs, causing other kinds of tuberculosis, collectively denoted as extra pulmonary tuberculosis. This occurs more commonly in immunosuppressed persons and young children.

Extrapulmonary infection sites include the pleura in tuberculosis pleurisy, the central nervous system in meningitis, and the lymphatic system in scrofula of the neck, the genitourinary system in urogenital tuberculosis, and bones and joints in Pott's disease of the spine. An especially serious form is disseminated TB, more commonly known as military tuberculosis. Extrapulmonary TB may co-exist with pulmonary TB as well[13].

PATHOGENESIS OF TUBERCULOSIS:

Mycobacterium tuberculosis is characterized by a complex cell wall rich in mycolic acid together with peptidoglycan and arabinogalactan, a complex polysaccharide molecule that surrounds the cell membrane. Many cell wall components are of pathogenic significance. Lippoarabinomannan (LAM) stimulates monocyte inflammatory activity principally by binding to the CD4+ receptor, also the binding site for bacterial lipopolysachrid[14]. The principle tissue immune response in tuberculosis is the formation of granulomas comprising cell of the monocyte lineage, including multinucleated giant cell and T lymphocyte. In initial stage of immune response, neutrophils are present; whereas more advanced disease is characterized by caseous necrosis and eventually deposition of calcium. After inhalation, mycobacterium tuberculosis is phagocytosed by the alveolar macrophage.Pulmonary surfactant protein may enhance the process of phagocytosis. The phagocytosing macrophage initiates the host immune response. Phagocytosis involves the compliment receptor CR1, CR2, CR3 as well as mannose receptor and adhesion molecule. Tuberculosis replicates within the cell by blocking fusion of phagosome and lysosome.

Mycobacterium have several mechanism to block the formation of phagolysome formation, including inhibition of Ca 2+ signals and blocking recruitment and assembly of the proteins which mediated Phagosome lysosome fusion which prevent the acidification of vacuole. Phagocytosis is potent stimulus to gene expression and secretion of pro inflammatory cytokines such as tumour necrosis factor (TNF), interleukin (IL) 1, IL 6. The known consequences of TNF secretion include fever and cachexia, two prominent symptoms of tuberculosis. TNF also have role in granuloma formation andis formed at the site of human infection. At early stage of infection, cellular recruitment to the granuloma is essential, and macrophage derived chemokins are important in the process[15].

TREATMENT:

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

The first- line drugs are Isoniazid, Rifampin, Pyrazinamide and Ethambutol. The usual daily dosages for adults are 300mg of Isoniazid, 6oomg of Rifampin, 15 to 30 mg/kg (maximum 2g) 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[16].

METHODS FOR MEASURING COMPLIANCE:

The methods available for measuring compliance can be broken down into direct and indirect methods of measurement. Each method has advantages and disadvantages, and no method is considered the gold standard.

Directly observed therapy, measurement of concentrations of a drug or its metabolite in blood or urine, and detection or measurement in blood of a biologic marker added to the drug formulation are examples of direct methods of measures of compliance. Direct approaches are expensive, burdensome to the health care provider, and susceptible to distortion by the patient. However, for some drugs, measuring these levels is a good and commonly used means of assessing compliance.

Indirect methods of measurement of compliance include asking the patient about how easy it is for him or her to take prescribed medication, assessing clinical response, performing pill counts, ascertaining rates of refilling prescription, collecting patient questionnaires, using electronic medication monitors, measuring physiologic markers, asking the patient to keep a medication dairy. Questioning the patient (or using a questionnaire), patient diaries, and assessment of clinical response are all methods that are relatively easy to use, but questioning the patient can be susceptible to misrepresentation and trends to result in the health care provider's overestimating the patient's compliance.

The most common method used to measure adherence, other than patient questioning, has been pill counts (i.e., counting the number of pills that remain in the patients medication bottles or vials). Although the simplicity and empiric nature of this method are attractive to many investigators, the method is subject to many problems, because patients can switch medicines between bottles and may discard pills before visits in order to appear to be following the regimen. For these reasons, pill counts should not be assumed to be a good measure of adherence[17,18,19].

DISCUSSION:

Management of Tuberculosis patients requires a multi-disciplinary approach by a multi-disciplinary team. Pharmacists form a crucial part of that multi-disciplinary team. As part of the multi-disciplinary team, Pharmacists can be involved at different stages in the value chain for TB control. Treatment- related barriers include TB treatment needs to be taken regularly and for a prolonged period of time, adverse effects experienced by patients which are often unpleasant, Complexity of regimen, Drug interactions which can efficient TB control[20].

Some of the barriers postulated to be contributing to poor TB treatment compliance are: Communication difficulties, low literacy levels, inadequate knowledge and low awareness of TB disease, patient attitudes and beliefs in treatment efficacy, depression and other psychiatric illnesses, alcohol and substance abuse, unstable living conditions, negative health provider attitudes, stigma and discrimination, overcrowding and access to medicines[21].

TB is a curable disease only if patients are given a complete and uninterrupted course of drug therapy and if they take these medications as prescribed. Pharmacists have an important role to play in the management and prevention of TB especially in aspects related to improving availability and accessibility of drug treatment; improving adherence to therapy and educating patients on the treatment and on the disease[20].

TB and Malnutrition, both are the problem of considerable magnitude in most of the underdeveloped region of the world. TB remains a major public health problem in India. Malnutrition enhances the development of active TB, and active TB makes malnutrition worse[22]. Malnutrition causes significant impairment of several important mechanisms of immune protection, including phagocytic function, cell-mediated immunity, antibody concentration, and cytokine production in TB. An impaired immune function is associated with nutritional deficiency, thereby weight loss and poor nutritional status[23].

Increased intake of protein was responsible for better treatment outcomes. Adjunctive protein supplementation may accelerate the beneficial therapeutic effect of TB chemotherapy and allowing them for faster recovery, which lends to better treatment outcome[22].

Nutrient intake was one of the most important host factor which is responsible for treatment outcomes in TB. Pharmacists interact with a large number of people on a daily basis and are therefore in an ideal position to distribute educational material to the public, not only on the treatment of TB but also on preventive measures. Health education either directly on a one-to-one basis or by the provision of health information leaflets targeted at the public are some of the ways that in which pharmacists can help curb the spread of TB.

The pharmacist should establish a relationship with his/her patients so that he/she can act as the patient's source of information on their disease condition as well as the treatment they have been prescribed[20].

CONCLUSION:

The clinical pharmacist involvement in management of disease has positive impact in creating awareness about the disease and medication which helps in the improvement of medication compliance along with patient quality of life. Innovative methods of managing such diseases have had some success in improving adherence when a regimen has been difficult to follow. Technologies such as reminders through cell phones and personal digital assistants and pillboxes with paging systems may be needed to help patients who have the most difficulty meeting the goals of a regimen[24].

REFERENCES:

1. Indian Journal of Tuberculosis, Vol. 61 New Delhi, January, 2014
2. Evans Danso*et.al*, Patients' Compliance with Tuberculosis Medication in Ghana: Evidence from a Periurban Community Advances in Public Health Volume 2015, Article ID 948487, 6 pages
3. Monroe, A.A, *et al.,* 2008. Involviment of health primary care teams in the control of tuberculosis. Rev. Esc. Enferm. USP., 42: 262-267.
4. E. Vermeire, *et.al.* J Clin Pharm Ther. 2001Oct;26 (5): 331-42.
5. Bakke PS, *et.al* (1995), Educational level and obstructive lung disease, given smoking habits and occupational airborne exposure: A Norwegian Community Study. Am. J. Epidemiol.1080, 141.
6. The Global Plan to Stop TB 2011—2015, Stop TB Partnership, World Health Organization, 2011
7. UzmaSaleem, *et.al*, Non compliance to tuberculosis therapy: a cross sectional study, Journal of Applied Pharmacy, April 2015, Vol. 7; Issue 2: 129-131.
8. Chiang CY, *et.al*, Challenges to the global control of tuberculosis. Respirology. 2013; 18 (4): 596-604.
9. Lienhardt C, *et al.* Global tuberculosis control: lessons learnt and future prospects. Nature Reviews Microbiology. 2010; 10: 407-416.
10. Phillips M, *et.al* Breath biomarkers of active pulmonary tuberculosis. Tuberculosis. 2010; 90: 145-151.
11. Siddiqi K, *et.al*. Clinical diagnosis of smear-negative pulmonary tuberculosis in low-income countries: the current evidence. The Lancet Infectious Diseases. 2003; 3: 288–296.
12. Danek SJ, *et.al*; Diagnosis of pulmonary tuberculosis by flexible fiberoptic bronchoscopy. Am Rev Respir Dis. 1979; 119 (4): 677-9
13. Madison B; "Application of stains in clinical microbiology". Biotech Histochem 2001; 76 (3): 119–25.
14. Arruda S, *et.al*; Cloning of an M; Science tuberculosis DNA fragment associated with entry and survival inside Cells 1993; 261(5127): 1454 – 1457.
15. John S fridland. (Ed), London; Tuberculosis: In Donald A, Jonathan C. Infectious disease, Vol 1, Mosby, 1995; 2.30.1
16. Alok bhardwaj, *et.al*, Assessment and enhancing adherence to treatment regimen in tuberculosis out patients, International Journal of Pharmacy and Pharmaceutical Sciences 2012, Vol 4, Issue 3.
17. Rudd P, *et al*. Pill count measures of compliance in a drug trial: variability and suitability. Am J Hypertens 1988; 1:309-12.
18. Pullar T, *et.al*. Time to stop counting the tablets? Clin Pharmacol Ther 1989; 46:163-8
19. Cramer JA, *et.al*. How often is medication taken as prescribed? A novel assessment technique. JAMA 1989; 261:3273-7. [Erratum, JAMA 1989; 262:1472.]
20. Gail Mkele, B Pharm, MSc (Med) Pharm, The role of the pharmacist in TB management SA Pharmaceutical Journal – March 2010.
21. Namibia. 2008c. Ministry of Health and Social Services. Namibia Tuberculosis Control Programme (NTCP) Report of 2007.
22. Van Lettow M, *et al*. Micronutrient malnutrition and wasting in adults with pulmonary tuberculosis with and without HIV co-infection in Malawi. BMC Infect Diseases. (2004) ,4, 61.
23. Cegielski JP, *et.al*. The relationship between malnutrition and tuberculosis: evidence from studies in humans and experimental animals. International Journal of Tuberculosis Lung Disease. (2004), 8(3), 218-26.
24. Molassiotis A, *et.al*. A pilot study of the effects of a behavioral intervention on treatment adherence in HIV-infected patients. AIDS Care 2003; 15:125-35