International Journal of Current Advanced Research
ISSN: O: 2319-6475, ISSN: P: 2319-6505, Impact Factor: 6.614
Available Online at www.journalijcar.org
Volume 8; Issue 07 (C); July 2019; Page No.19547-19551
DOI: http://dx.doi.org/10.24327/ijcar.2019.19551.3780

Research Article

STUDY OF ADVERSE DRUG REACTIONS IN TUBERCULOSIS PATIENTS UNDER RNTCP DOTS IN TERTIARY TEACHING HOSPITAL

Suchanda G[1], Yadav P*[2], Deolekar P[3], Satyendra Badhe[4] and Mihika Agarwal[5]

[1]Clinical Pharmacologist Medical Super Speciality Hospital Kolkata
[2,3,4,5]Department of Pharmacology, D.Y. Patil University, School of Medicine. Navi mumbai

A R T I C L E I N F O

Article History:

Received 10th April, 2019
Received in revised form 2nd May, 2019
Accepted 26th June, 2019
Published online 28th July, 2019

Key words:

Multidrug regimen, Adverse drug reactions, Vomiting, non-compliance, Counseling

A B S T R A C T

Introduction: Tuberculosis is one of the leading causes of deaths worldwide. DOTS is a measure implemented under RNTCP with STOP TB STRATEGY to control the rise of incidences of all types of tuberculosis cases. It comprises of multidrug regimen treatment for longer duration of time. Almost every anti tubercular drug is associated with some or the other adverse drug reaction (ADR's). Patients decision to stop the treatment were influenced majorly by adverse drugreactions occurring during the treatment and also because of lack of knowledge regarding the adverse drug reactions and the importance of early reporting at the first sign and symptom of its occurrence to the treating physician. In view of above we undertook the present study to evaluate the burden of adverse drug reactions due to tuberculosis treatment in our hospital, we also tried to evaluate the cause of adverse drug reactions in these patients. ***Material and methods:*** A total number of 100 patients were included in the study from the pulmonary medicine department of D.Y. Patil University School of Medicine and hospital for period of 11 months. Those patients who fulfilled the inclusion criteria of the study were taken into the study after obtaining a written informed consent form. The case record files of patient included in the study were scrutinized and statistically analyzed using frequency and percentages. Causality and Severity was analyzed using Naranjo's causality scale and Modified Hartwig's and Siegel scale. No laboratory parameters analysis was done to assess the adverse drug reaction or to find the cause of the reaction. The causal drug for any adverse reaction was evaluated with the help of treating physician and the findings of causal drug were purely knowledge based. ***Results:*** 75% of patients had ADR's. Females were more affected with adverse drug reaction during the treatment as compared to males. Majority of study population was in the age group of 30-40years and high no. of adverse drug reaction was observed in the age group of 20-40 years of age. There was no association of alcohol intake, smoking or tobacco use in occurrence of adverse drug reaction.44% of total population had suffered from ADR in the intensive phase of treatment and 14% in the continuation phase. Vomiting was the most common adverse drug reaction seen in patients with almost 24% of patients suffering from it. GIT was the most common system involved. Isoniazid was found to be the most common drug responsible for majority of adverse drug reactions**.** 60% of patients out of the total suffering from ADR required management of ADR by the treating physician. 54% of patients scored Probable causality assessed and treated by the treating physician Majority of Patients i.e. 84% had ADR of mild severity. ***Conclusion:*** Anti TB drugs may cause high incidences of adverse drug reactions resulting in non-compliance and sometimes stoppage of treatment. This leads to increase in mortality and morbidity. The study concluded that there is high burden of adverse drug reactions among patients taking ant tubercular drugs. Early detection of adverse drug reactions and its notification to the treating physician is very important for early remission and patient compliance. Counseling of patients for early detection, prevention and management of adverse drug reaction is highly suggestive.

INTRODUCTION

Tuberculosis (TB) is a major health problem in India with a rising count of more than20 per cent of the global incident cases [1]. Tuberculosis (TB) is one of the most commoninfectious causes of morbidity and mortality, being a curable and preventable disease; it continues to impose an enormous health and economic burden on India. According to World Health Organization (WHO) the global Impact of TB is such that it is prevalent in every part of the world [1, 2]. TB is a treatable and curable disease. Active, drug-sensitive TB disease is treated with a standard six-month course of four antimicrobial drugs that are provided with information, supervision and support to the patient by a health worker or trained volunteer [3].

Antitubercular drugs, in addition to their role in destroying and inhibiting Mycobacterium tuberculae, also cause different kinds of adverse drug reactions involving almost all systems in the body including the gastrointestinal system, liver, skin, nervous system, otovestibular apparatus and eyes [4] for e.g. First line drugs like Isoniazid causes peripheral neuritis, hepatotoxicity and sometimes symptoms like rash, fever, anaemia, opticatrophy, lupus like syndrome, psychosis and gynaecomastia. Rifampicin causes orangediscolouration of urine. Ethambutol is associated with optic neuritis and hyperuricemia is seen in Pyrizinamide. Amongst second line drugs the side effects mostly commonly seen are bonemarrow suppression and Steven Johnson syndrome seen with Thiacetazone, Para aminosalicylic acid(PAS) causes kidney, liver n thyroid dysfunction, whereas Capreomycin is associated with hypokalemia and hypomagnesaemia, Rifabutin a derivative of rifampicincauses yellow discolouration of skin(pseudo jaundice) along with anterior uveitis and polymyalgia syndrome, and Cycloserine is a second line drug leading to neuro psychiatricadverse effects [5]. Also ADR of one drug may be potentiated by companion drug. These Adverse drug reactions are the major cause of noncompliance to antitubercular treatment.

Corresponding author:* **Yadav P
Department of Pharmacology, D.Y. Patil University, School of Medicine. Navi mumbai

In India, Tuberculosis is a disease which is strongly associated with poverty and deprivation. TB patients encounter innumerable constraints in getting proper treatment and adhering to it. Many studies have shown various reasons for default such as inconvenience of clinic timings resulting in loss of wages, cost of travel to the clinic, lack of provision for continuity of treatment in case of a family emergency resulting in a missed visit to the clinic, poor management of adverse events and toxicity. Therefore despite the availability of effective chemotherapy, TB is still a major health problem is most countries. This can be attributed to poor patient compliance, to primary multidrug resistance and to interruption partly due to adverse drug reactions [5].

Adverse drug reactions due to their severity not only contribute to noncompliance to therapy but, may also lead to stoppage of treatment leading to development of resistant strains requiring second line therapy of drugs with higher cost and more serious adverse drugreactions.[5] Various factors like genetic, environmental, diet, disease pattern, and nutritional status, paucity of data because of limited ADR monitoring centres and use of modern drugs along with traditional remedies influence the nature of adverse drug reactions [7]. The increasing rate of adverse drug reactions also contribute to excessive healthcare cost through increased patient morbidity and mortality which is of great concern to the general population, the pharmaceutical industry, the regulatory authorities and the medical profession [6]. Adverse drug reaction can be prevented by early detection by the treating physician. Health personnel can monitor adverse drug effects by teaching patients how to recognize the symptoms of common effects, urging them to report if they develop such symptoms, and by asking about symptoms when patients come to collect drugs.[6] Some of the adverse drug reaction for eg. Isoniazid induced peripheral neuropathy shows symptoms like peripheral numbness or a tingling or burning sensation of the hands or feet and occurs more commonly in pregnant women and in people with the following conditions: HIV infection, alcohol dependency, malnutrition, diabetes, chronic liver disease, renal failure, if reported early can be given immediate preventive treatment with pyridoxine, 10 mg/day along with their anti-TB drugsand the adverse reaction thus can be avoided. Thus we are conducting this study to:1) Monitor adverse drug reaction of anti-tubercular drugs.2) To identify the causes of adverse drug reactions in patients on anti-tubercular drug with the help of treating physician
3) To find out the effect of management in case of adverse drug reaction.

Aims and Objectives

Our aim is to study the adverse drug reaction in tuberculosis patients who are under RNTCPDOTS treatment.

1. To find out Adverse Drug Reactions in patients on anti-tubercular drugs under RNTCPDOTS regime.
2. Effect on adverse drug reaction on stopping or decreasing the dose of causal drug.
3. Benefit to the patient by early detection of adverse drug reaction and its treatment by the treating physician.

MATERIALS AND METHODS

This is a prospective cross sectional observational study conducted at RNTCP-DOTS centre in tertiary teaching hospital to observe the adverse drug reactions due to antituberculardrugs.

Study Subjects

Patients with pulmonary and extra pulmonary Tuberculosis attending the RNTCP-DOTS centre of D.Y.Patil University School of Medicine and hospital were taken as a part of the study for a period of 11 months. All the patients were screened for fulfillment of eligibilitycriteria.100 patients were included in the study after obtaining written informed consent form from legally accepted representative. Approval and clearance from institutional ethical committee was taken. The patient information was recorded on a customized data collection sheet.

The inclusion criteria- was Adult patients diagnosed with sputum positive pulmonary or extra pulmonary tuberculosis and undergoing treatment under RNTCP-DOTS regime, Patients of either sex with TB, pediatric patients under the age group of 12 years, and patients who gave informed consent to participate in the study.

The exclusion criteria was Critically ill patients admitted in hospital, HIV Positive patients with tuberculosis, Patient lost to follow up due to any reason, Patients unable to respond to verbal questions.

The study included 100consecutive diagnosed TB patients attending RNTCP –DOTS center of Dr.D.Y. Patil University School of medicine and hospital. The patients were selected irrespective of age, sex, and race.

Patients receiving other treatment regimens were excluded, as were those who were transferred, those who abandoned treatment, and those whose diagnosis was changed during the course of the treatment, and died because of reasons other than ADRs during the monitoring. Patients were divided according to the newer category of treatment they were receiving under DOTS.

Detailed history of patients was taken to note their dietary habits, whether they had the habit of smoking or alcohol consumption. Patients put under RNTCP-DOTS regime under supervision were monitored and were followed up regularly till the end of the course for any adverse drug reaction during their course of treatment. Patients with MDR or XDR TB were also monitored carefully for any adverse drug reaction. Patients were asked for the time of occurrence of the adverse drug reaction, whether during the start of treatment i.e. Intensive Phase or during Continuation Phase. When suspected ADRs were detected, they were brought to the notice of the medical officer for further evaluation. Details regarding the suspected drug, duration of onset of reaction, brief description of the reaction were noted in the patient record form. The adverse drug reaction and the causal drug of the reaction was studied under guidance of treating physician, no laboratory parameters tests however, were done for the assessment of adverse drug reaction. Proper measures taken to decrease the adverse drugreaction by the treating physician were noted.

Severity of the ADRs were classified according to Hartwig *et al* [7]. The findings are based on a questionnaire and the results are evaluated on the basis of score on a scale of 13.Thus a score greater than 9 gives definite score, a score between5-8 is Probable and a score 1-4 is Possible. [8]

The documented data was subjected for descriptive statistical analysis. All the results were calculated in percentages and frequency. Common ADRs, common drugs accounting for ADRs, systems involvement, causality assessment (assessed by Naranjo's algorithmic scale) [8], Severity of ADRs by Modified Hartwig and Siegel Scale [7] were studied. Causality which was assessed by Naranjo's algorithmic scale [7] is the most common assessment tool of ADR, and verifies the chances of whether an ADR is essentially due to the drug or it is the result of other causes, the likelihood is consigned by the score, termed as definite, probable or possible. Examples of ADRs assessed as severe are those that caused the death, directly life-threatening, lengthened hospitalization, or shift to a higher level of clinicalcare [8]

RESULTS

The major population in this study consisted of females (51%) than males (49%). Females had more number of incidence of ADR than males (40% females and 11% males). The age group in this study ranged from 20-70 years and the average age when calculated came out to be between 30-40 years of age i.e. more number of patients were in the age group of 30-40 years of age. The average age of occurrence of ADR was seen in the age group of 20-30 years i.e. 24% of patients between the age group 20-30 had some or the other ADR.

Among these, more number of ADR developed in non smokers than in smokers with values 40(53.33%) in non smokers and 35(46.67%), no ADR in this group was seen more in non smokers16 (64%) than in smokers 9(36%), among alcoholics group, 47(62.67%) of non alcoholics and 28(37.33%) of alcoholics developed ADR.

Maximum number of ADRs were seen at the initial phase of treatment i.e. the Intensive phase of treatment with 44% of study population showing ADR in the intensive phase and 14% in the continuation phase. Out of the patients who did not have any ADR 10% were in the intensive phase of treatment and 7% in the continuation phase.

Most common ADR seen was vomiting i.e. 24%of patients presented with vomiting at the start of treatment; generalised weakness and headache came next with 15% of patients experiencing it. Fever was seen in 12% of patients, other ADR that were seen are arthritis in 10%, abdominal cramps and gastritis 9%, numbnessin 7%, blurred vision and pleural effusion was seen in 5% of patients, raised serum Creatinine and skin rash was evident in 4% of patients, loose motions in 3% and lastly skin rash was seen in 2 % of patients.

Table no 1 list of ADRs seen

Adverse event	N	
Vomiting	24	24.00%
Generalized weakness	15	15.00%
Headache	15	15.00%
Fever	12	12.00%
Arthritis	10	10.00%
Abdomen Cramps	9	9.00%
Gastritis	9	9.00%
Numbness	7	7.00%
Blurred Vision	5	5.00%
Pleural Effusion	5	5.00%
Raised Serum Creatinine	4	4.00%
Skin Rash	4	4.00%
Loose Motions	3	3.00%
Burning Sensation	2	2.00

Gastrointestinal system was highly involved with 61% of patients showing GIT signs which included nausea, vomiting, abdominal pain, diarrhea. 27% of patients had CNS and PNS involvement which included headache, fever, numbness, burning sensation. Musculoskeletal involvement showed signs of generalized weakness with 21% of patients affected with it. Skin and appendages included skin rash and 19% of patients were affected. Ophthalmology included blurred vision with 17% patients affected, 11% of patients were affected with arthritis, and renal involvement was seen in 5% of patients.

Table no 2 Distribution of ADRs according to Causal drug

Causal Drug	N(%)
isoniazid	17 (17.0)
Ethambutol	8 (8.00)
capreomycin	4 (4.00)
pyrizinamide	4 (4.00)
Streptomycin	4 (4.00)

Isoniazid was the most common drug for major adverse effects in this study, with 17% of ADRs due to Isoniazid, second came Ethambutol with 8% involvement and capreomycin, pyrizinamide and streptomycin were the other causal drugs that followed with each 4% involvement.

75% of patients who developed ADR 60% of patient have required symptomatic treatment of ADR and in 40% of patients ADR resolved on its own.

Table no 3 Causality assessment

Causality	N(%)
Probable	54 (54.00)
Possible Causality	35 (35.00)
Certain	11 (11.00)

DISCUSSION

Tuberculosis is becoming a disease of major concern and which requires upmost importance in category of infectious diseases worldwide. The treatment regimen of tuberculosis needs good patient adherence [9] for a better outcome as the antitubercular treatment requires continually taking drug combinations of different antitubercular drugs for a prolonged period of time. [4] Non compliance in tuberculosis is the major cause of loss to follow up or incomplete treatment. In India tuberculosis is often associated with poverty, deprivation. TB patients encounter innumerable constraints in getting proper treatment and adhering to it. Antitubercular treatment along with its proven efficacy comes with a package of adverse drug reactions occurring due to single drug or combination drugs. Most Important adverse drug effect are hepatitis, joint pain, skin rash, gastro intestinal upset (nausea/vomiting/GI upset), hyperuricemia, constipation, peripheral neuropathy, and visual disturbances. Due to these adverse drug reactions TB treatment is hampered with poor patient compliance and intolerance, this was the finding WHO (WHO 1997) and many studies also concluded the same.

DISCUSSION

In this study out of 100 patients 33% population was in the age group of30-40 years of age and majority of ADR was seen in the age group 20-30 years of age. This result is in contrast with the study conducted by Sinha *et al* in 2015 in Imphal[10] which showed more ADRs in 31-40 years of age group, and in study conducted at Malaysia 2012, most of the ADRs were seen in wide age group of 18-54 years [11]. This study results were due to the fact that maximum no. of patients that attended

RNTCP-DOTS clinic of pulmonary department were in the age group of 30-40 years which is the age of highest responsibilities and occupational stress often leading to health negligence. Among these finding of ADR in the younger age group was i.e. 20-30 years was similar to the study by Abideen PS *et al* in 2013with the mean age 20.38. [12] Edoh and Adjei, also found higher incidence of TB in the age group of 21-40 years with the highest peak of 29.7% in the group of31-40 years. [13]

Out of total 100 patient's population, 75% of patients had developed ADR and 25% had not developed ADR. This result is much higher than the results obtained by Anupa Khetri Chhetri in 2008 in Nepal [14] where out of the total study population54% patients had developed ADR and also by Mishin *et al* [15] in a study conducted in Russia in2003, where 16.9 % of total study population had developed ADR. Finding similar to the Nepal study was seen in a 2006 study conducted by KheirollahGholami[16] where out of 83 patients44 patients' i.e. 53% were found to have ADR. Another study showed of Malaysia by Fivy *et al* showed that out of 653 study populations 103 had adverse drug reaction which is much lessthan the findings of current study. Incidence of ADR was less in a study conducted by Hema *et al* [17] where out of the total study population only 11.8% of patients suffered one or more ADR.

Development of ADR highly depends on genetic, demographic, geographical and nutritional status of patients. Tuberculosis treatment consist of 2 phases; Intensive Phase and Continuation Phase. In our study maximum ADRs had occurred during the Intensive Phase of treatment i.e. 44%. This finding is similar to study conducted by K V Ramanth *et al* in 2012 [18] where 46% of study population had occurrence of ADR in the intensive phase. A similar study was conducted in Malaysia in 2012 [11] where analysis of different drug combination used in Intensive phase and continuation phase was done and it was found that majority of ADR occurred in Intensive phase. Thus, these finding correlate with the finding of current study.

Majority of the study population who suffered from ADR were from category 1 of treatment with values 31% females and 24%males. This result is similar to the result in study conducted in Imphal by KumarjitSinha *et al*[10] where majority of population suffering from adverse drug reaction were in category I followed by II and then category III. In our study category I was followed by category II and then category IV according to new classification of TB categories. Also it co-incides with the finding of study in Karnataka in 2012 by K V Ramanath[18] where 46% of patients with ADR were in category I.

In this study with the help of the treating physician the causal drug for specific adverse drug reaction was tried to evaluate and it showed that Isoniazid was most commonly the cause of adverse drug reactions accounting to 17% of all the adverse drug reactions. These findings were similar to a study conducted in 2006 by Gholami *et al* [19] where Isoniazid was found to be the major cause of Hepatotoxicity in their study. The findings of the current study contradicts to findings of 2014 study conducted by SaiprasdBhise *et al* [20] where CNS was the main system that was affected and it was due to the drug Cycloserine and second line Flouroquinolones followed. In A study conducted by Farazi *et al* [21] had results similar to the current study with Isoniazid responsible for most of the adverse drug reaction but it also considered Rifampicin responsible along with Isoniazid. The result of study done by KumarjitSinha *et al* [10] shows GIT most commonly involved similar to current study but contradicts in causal drug result, showing pyrizinamide and rifampicin as the most common drugs to cause GIT symptoms ADRs. As no laboratory investigations was done to find the causal drug behind occurrence of any adverse drug reactions, the findings of this study were evaluated by the treating physician.

Out of the 75% of study population who acquiredone or the other ADR, 60% of the patients required treatment for the adverse drug reaction and in 40% of patients the ADR was cured without any treatment. This result contradicts the result found in 2006 study by Gholami *et al* [16] where 21% of patients required symptomatic treatment for the alleviation of the side effects and 33.3% patients did not require any specific treatment. In a similar study conducted in Malaysia by Fivy Kurniawati out of total 653patients 8.6% required add on medication for the adverse drug reactions [11].Another study byKhade *et al* [22] required additional supplementary medication for treatment of adverse effectslike antihistaminic for treatment of rashes and antacids for gastritis; a much smaller no. of adverse drug reactions i.e. 30% were treated in a study conducted by Damasceno *et al* [23]in Brazil. Treatment of adverse drug reactions depends on the time at which it has been noticed by the treating physician, and it can be diagnosed early if the patient is educated about the signs and symptoms of drug reaction. In our findings the higher no. of patients requiring the treatment was may be as a result of lack of knowledge about the adverse drug reactions due to antitubercular drugs.

54% of patients scored Probable and 35% scored Possible causality whereas 11%showed certain causality. In a study by Verma *et al* in 2015 [24] showed similar findings with58% of study population scoring probable score, 31.86% scored possible and only 9.8% scored Certain. This was in variation with study by Hema *et al* [17] where higher number of patients i.e.64% scored Possible relation with the drug. A similar assessment by Ramanath K V *et al* [18] showed 100% patients scoring Probable causality. Severity assessment by Hartwig scale analysis in current study majority of study population with ADR had mild ADR accounting to 82%.,28% had moderate ADR and only 1% had severe ADR who had to be referred to higher centre. High number of mild cases was also seen in astudy conducted in central India in 2015 by ReenaVerma *et al* [24] where 68.8% ADR were of mild severity. Another study by Damasceno *et al* in 2012 [23] had 71% cases with mild adversedrug reaction,. Findings of current study was contradict to study by Tag *et al* in Abbasia[25] here 26.2% were mild and 73% were moderate i.e. higher number of patients were seen in moderate category. The current study findings were purely based on patients' compliance and the severity was assessed on the basis of any additional treatment required for the remission of adverse drug reaction. Overall trend of this study was to observe any adverse drug reaction that can occur with antitubercular drugs or during tuberculosis treatment regimen. Early diagnosis of adverse drugreaction is very important in treating adverse drug reactions occurring due to antituberculardrug.

Limitations of this study were a smaller sample size and also no laboratory parameters were done to assess adverse drug

reaction. The duration of study period was also short, thus there is however a need for larger patient population with longer duration of study.

References

1. WHO Report 2010. Global TB Control; Epidemiology, Strategy and Financing; Geneva: World Health Organization; Geneva; 2010; available at; www.reliefweb.int.
2. Kuldeep Singh Sachdeva, Ashok Kumar *et al*; Indian *J of Med Res*; New Vision for Revised
3. National Tuberculosis Control Programme (RNTCP): Universal access - "Reaching the unreached"; 135; 2012; 690-694.
4. The Pharmacological Basis of Therapeutics; Goodman and Gilman 12thEdition; page no;1553.11thEdition; page no; 1205, 10th Edition; page no; 1227-1242
5. K.D. Tripathy; Essentials of Medical Pharmacology; 6th Edition page no; 742-753.
6. Basic Principles of RNTCP; Book on Tuberculosis; Edition 5th; 896-95.
7. TBC India; History of Tb; Formulation of RNTCP;www.tbcindia.nic.in/history.html7. Hartwig SC, Siegel J, Schneider PJ. Preventability and severity assessment in reportingadverse drug reactions. Am J Hosp Pharm 1992; 49: 2229‑32.
8. Naranjo CA, Busto U, Sellers EM, Sandor P, Ruiz I, Roberts EA, *et al*. A method forestimating the probability of adverse drug reactions. Clin PharmacolTher 1981; 30(2):239-45.
9. Abideen PS, Chandrasekaran K, Uma Maheswaran, Vijayakumar A, Kalaiselvan V, *et al*.Implementation of Self Reporting Pharmacovigilance in Anti Tubercular Therapy Usingnowledge Based Approach. *J Pharmacovigilance* (2013) 1: 101.
10. Sinha *et al*; Adverse drug reactions in TB patients under DOTS; The J of Assoc of ChestPhysicians; 2013; Vol 1(2).
11. FivyKurniawati *et al*; Adverse Drug Reactions of Primary Anti-tuberculosis Drugs AmongTuberculosis Patients Treated in Chest Clinic; *Int. J. of Pharm. & Life Sci*. (IJPLS); 2012; Vol.3(1); 1331-1338 1332.
12. Abideen PS, Chandrasekaran K, Uma Maheswaran, Vijayakumar A, Kalaiselvan V, *et al*.Implementation of Self Reporting Pharmacovigilance in Anti Tubercular Therapy Using Knowledge Based Approach. *J Pharmacovigilance* (2013) 1: 101.
13. Edoh D, Adjei R. Rapid assessment of a National Tuberculosis (TB) Control Programme inEastern Ghana. *Afr J Health Sci*; 2002; 9:159‑64
14. AnupaKhatriChhetri, ArchanaSaha eat al; A study of adverse drug reactions caused byfirst line anti-tubercular drugs used in Directly Observed Treatment, Short course (DOTS) therapy in western Nepal, Pokhara; *J Pak Med Assoc*; 2008; Vol. 58(10); 532-536.
15. MishinVIu, Vasil'eva IA, Makieva VG, Kuzmina NV; Frequency, pattern, and diagnosisof adverse reactions in patients with pulmonary tuberculosis during chemotherapy with leading drugs; Probl TuberkBoleznLegk; 2003; 7: 24-9.
16. Gholami K, Kamali E, HajiabdolbaghMi, and Shalviri G. Evaluation of anti-tuberculosisinduced adverse reactions in hospitalized patients. Pharmacy Practice 2006; 4(3): 134-138.
17. Hema N.G, Bhuvana K.B, Virupaksha H.M; Critical Assessment of Adverse Drug reactions to Antitubercular Drugs in a Government Teaching hospital; *Int J Basic Med Sci*; 2013; 2(3); 60-65
18. K.V. Ramanath, Ramesh.S1; A Study on Assessment of Adverse Drug Reactions in Tuberculosis Patients; *American Journal of Pharmatech Research*; 2012; 2(2); 584-592.
19. Gholami K, Kamali E, HajiabdolbaghMi, and Shalviri G. Evaluation of anti-tuberculosis induced adverse reactions in hospitalized patients. Pharmacy Practice 2006; 4(3): 134-138.
20. SaiprasadBhise, YugandharaBobade, Sana Baig, Amitkumar Anandrao Khade; Occurrence and Proportional Analysis of Adverse Drug Reactions in Dots Plus; *Int J of Pharmacy and Pharmaceutical Research*; HUMAN; 2014; Vol. 1(1): 29-34.
21. AliasgharFarazi, MasoomehSofian *et al*; Adverse Reactions to Antituberculosis Drugs in Iranian Tuberculosis Patients; Tuberculosis Research and Treatment; 2014, Article ID 412893
22. AA Khade and Gothal; Incidence and Comparative Analysis of Adverse Drug Reactions in Dots; *Int J of Pharmaceutical Sci and Research*; 2013; Vol. 4(9): 3641-3644.
23. Glauciene Santana Damasceno, LusieleGuaraldo, Elyne Montenegro Engstrom *et al*;Adverse reactions to antituberculosis drugs in Manguinhos, Rio de Janeiro, Brazil; Clinics2013; 68(3); 329-337
24. ReenaVerma, Mahor Gr, Arun Kumar Shrivastava, Prashant Pathak; Adverse DrugReactions Associated With First line Anti tubercular Drugs In A Tertiary Care hospital of Central India: A Study Of Clinical Presentations, Causality, and Severity; *Asian J Pharm Clin Res*; Vol 7(5); 2014, 140-143.
25. Mohammad A. Tag El D, Ashraf A. *Et al*; Adverse reactions among patients being treatedfor multi-drug resistant tuberculosis at Abbasia Chest hospital; *Egyptian Journal of Chest Diseases and Tuberculosis*; 2015.

How to cite this article:

Suchanda G *et al* (2019) 'Study of adverse Drug Reactions In Tuberculosis Patients Under RNTCP Dots In Tertiary Teaching Hospital', *International Journal of Current Advanced Research,* 08(07), pp. 19547-19551.
DOI: http://dx.doi.org/10.24327/ijcar.2019.19551.3780

****