Microbiology: An International Journal

Review | Vol 2 Iss 2

Review on Necrotizing Fasciitis: A Rare Flesh Eating Disease

Ravi Kiran Raparthi[1,2*] and Naresh R

[1]Department of Pharmaceutics, Lalitha College of Pharmacy, Anurag Group of Institutions (CVSR), Ghatkesar, Hyderabad, Telangana, India

[2]Department of Biological Science, ZPSS Pippalkoti, Adilabad 504001, Telangana, India

[*]**Corresponding author:** Ravi Kiran R, Department of Pharmaceutics, Lalitha College of Pharmacy, Anurag Group of Institutions (CVSR), Ghatkesar, Hyderabad-501301, Telangana, India, E-mail: kiranraparthi4@gmail.com

Received: March 02, 2017; **Accepted:** April 11, 2017; **Published:** April 17, 2017

Abstract

Necrotizing Fasciitis is a rare disease that is often called as the Flesh Eating Disease, which leads to the damage of the body's soft tissue which is said to be as fascia. It is a severe cause which includes the severe body pain, itching, fever and vomiting. Most probable body parts which are likely to be get affected by fasciitis is perineum and limbs.

The probability of getting affected by this disease is more in the people with diabetes, cancer, alcoholism, obesity and elderly patients. This disease will not get affected from one to one by contact or by through any other mode as it is not an air-borne. In the initial stages of the fasciitis, the signs and symptoms will be like swelling in the soft tissues, discoloration in the skin, blisters, furthermore all this things will happen in the initial hours, where the redness of skin will takes place and there on subsequent necrosis will occur within the subcutaneous tissue. The major causing organism for this disease is MRSA (Methicillin-resistant *Staphylococcus aureus*) and may cause by the other bacteria too. Major types of Type 1 (necrotizing fasciitis are polymicrobial), Type 2 (streptococcal MRSA group), Type 3 (gas gangrene), and others like marine organisms (candida and zygomecetes).

Keywords: ***Gas gangrene, MRSA, Necrosis, Air-borne***

Introduction

In every year the cases of necrotizing fasciitis are increased worldwide, about 600-700 patients are diagnosed in the United States and out of these 25%-35% cases are leading to death. Bacteria may enter into the body by various source or injuries such as cuts, bites and abrasions [1-9]. Major causative bacteria is said to be the group A Streptococcus (GAS) bacteria [2,10-14]. Often the symptoms will show within 24 hours of the infection, symptoms are likely to be as increasing pain, redness and warmth around the wound, flu like symptoms such as diarrhea, nausea, fever, dizziness, and thirst causing due to dehydration.

Symptoms

Symptoms are often more confusing and unimagined where illness is the major symptom, pulled muscle is said to be observed in some people and skin will become red as the areas will become swollen where it spread easily [15-21]. The

chances of ulceration, severe pain in the muscles associated with fever. Probability of severe pain will be at the wounds of the affected area [5,22-26].

Treatment

Immediate treatment is required as the first line antibiotics are suggested; the strong antibiotics given through a vein but because of the bacterial toxins may decay or destroy the soft tissue and there by reduces the blood flow [4,27-34], in addition to this surgical exploration is much needed for the early recovery or to eradicate the severe pain [35-38].

Cause

Hands and legs are severely affected with the necrotizing fasciitis as this leads to the death, the primary detection and first line treatment is mandatory [39-45]. In 1883 Joseph Jones, a Confederate Army surgeon, during the US Civil War first described the Necrotizing fasciitis. In the year 2010, a group of scientists and surgeons from Portland, Oregon, wrote the collective review on the first line treatment and diagnosis [10,12,46-55]. In 2011, Dr. Rausch and Dr. Foca made a documented report and ended with the statement of "early diagnosis of this disease will be the lifesaving"

A foundation has started in the name of National Necrotizing Fasciitis Foundation (NNFF) by the fasciitis survivors by name Donna and Jackie [56-67]. In the past 16 years, these two persons have united as leaders in the society [68-74], worked diligently in the volunteer staff for the foundation mission to bring out the awareness about necrotizing fasciitis, and to save the lives from misdiagnosing.

Diagnosis and Treatment

This disease is similar to the gangrene that is affected with myeloproliferative neoplasms (MPNs) and is more resembled with the cellulitis in external [75-82]. Borja Apellaniz Aguirre has written an article in the Journal of Infectious Diseases & Therapy on the programming of early diagnosis of fasciitis from an unknown origin. Facial necrosis goes before muscle and skin contribution, consequently its namesake [83-88]. The average death rate is 25%-30% over 70% of cases are related with poisonous stun disorder. The living organism identified with NF are gathering A beta-hemolytic Streptococci (type II NF), with or without staphylococcal contamination.

The investigation of extracellular proteins that assume a part in the pathogenesis of GAS and known as "streptococcal pyrogenic poisons" utilizing PCR system demonstrated that they were not uniformly circulated among the GAS bringing on various sorts of malady. Subsequently a few atomic writing frameworks have been presented and detailed as option apparatuses. Serotyping of GAS in view of protein M, a noteworthy surface destructiveness calculate, has for some time been utilized as the best quality level for the epidemiological reconnaissance of the diseases created by this pathogen [6-8,89-92]. As of late it has been broadly supplanted by comparable methods in light of sequencing the hyper variable area of the emm quality encoding the M protein. Another author Mona Z Zaghloul has elaborated the post effects of Tropical Medicine & Surgery, in the Journal of Tropical Medicine & Surgery with his editorial work on fasciitis. Early restorative treatment is regularly hypothetical in this manner where anti-toxins ought to be begun when this condition is suspected. Beginning treatment regularly incorporates a mix of intravenous anti-infection agents including piperacillin/tazobactam, vancomycin, and clindamycin [93-96]. Societies are taken to decide proper anti-infection scope, and anti-infection agents might be changed when culture results were obtained.

Figure 1: Leg affected with Necrotizing Fasciitis.

Clinical and Experimental Dermatology conference is going to held on June 19-20, 2017 in Philadelphia, USA, with the theme of "The Skin - Interface with the World" and this will help out in endeavoring the new emerging practices in the dermatology and plastic surgery, In the early stages it may appear as cellulitis, and later by spreading onto the external tissues of the skin. 23rd Asia-Pacific Dermatology Conference is to be held in Osaka, Japan, which will aim for "Exploring the prior Possibilities in Dermatology". The global market analysis of this conference is said to be the high and varied about to get the major speakers and presenters from USA and Philippines. Kim Alexander Papp, who is an eminent speaker from Probity Medical Research, Canada and he presented on the Androctonus bicolor scorpion venom inhibits 7,12-Dimethylbenz[a]anthracene initiated and croton oil along with the Sven Richter [97-99], evaluated the skin cancer in mice.

Dermatology Associates of SEATTLE is promoting the specialties such as novel treatments like acupuncture, and other innovative treatments in the dermatology. Dermatology Associates, P.S.C. has served the Greater Louisville community for over 25 years and is located at east end of Louisville, DA PSC is a fully service dermatology practice center which is dedicated to provide the solutions for all of your skin care needs [6].

Dermatology Associates is one of the largest dermatology practice plot in Northern New England. They are committed to give the best and most innovative clinical and skin care in surgical to all varied ages in a convenient and patient-friendly environment [100].

Conclusion

Cellulitis and Necrotizing fasciitis is very much similar in the external appearance, and both are similar in morphology, where cellulitis is serious bacterial infection where it can be treated with the specialized physicians, the causative organism is Staphylococcus, probability is more at the legs and arms. Necrotizing fasciitis is said to be the severe life threatening disease which needs the grafting of the skin and may affect any of the body parts. Evaluated first line treatment with antibiotics will prevent from severe infections of the body. Much severe attention is needed at the minor cuts, insect bites; incisions of surgeries are major common sites of the infection.

References:

1. Bloomfield JG, Cornish JC. A blended approach using e-learning to develop the clinical skill of aseptic technique. Int J Clinical SKills 2015; 9 (1), 1-11.
2. Merrick I, Gilligan N. Occupational therapy and nursing students' impressions of structured and discovery based teaching approaches to delivering breakaway skills as part of their pre-registration training. Int J Clinical SKills (2015) 9 (1), 12-18.
3. Pereca J, Emelifeonwu J. How to Safely Perform Lumbar Punctures In Adult Patients. Int J Clinical SKills (2016) 10 (1), 16-21.
4. Schweinfurth D, Baier RD, Richter S. Abdominal tuberculosis: a benign differential diagnosis for peritoneal carcinosis: report of a case. Mycobact Dis. 2014; 4:173.
5. Isaiah IN. Immunoinflammation and elevated serum procalcitonin in patients with resistant strain Mycobacterium tuberculosis in benin metropolis. J Med Microb Diagn. 2014; 3:154.
6. Therese KL. A pilot study on the detection of multidrug resistant tuberculosis in hospital based population of Chennai, India. J Med Microb Diagn. 2014; 3:153.
7. Ekpe EE, Obot V. Indications and outcome of surgery in pleuropulmonary tuberculosis. Trop Med Surg. 2014; 2:174.
8. Patil JS. New theoretical background for tuberculosis treatment. J Pharmacovigil. 2014; 2:e123.
9. Chakrabarti K. Tuberculosis in children. J Preg Child Health. 2014; 1:e102.
10. Adedemy DJ, Noudamadjo A, Agossou J, et al. factors associated with drop-out between tuberculosis and measles immunization among infants in Parakou (Benin) in 2012. Pediat Therapeut. 2015; 5:219.
11. Schmaltz CAS, Costa MJM, Cattani VB, et al. Pharmacological interaction of lopinavir/ritonavir 800/200 mg bid and rifampicin in subjects presenting tuberculosis with contraindication for an efavirenz containing antiretroviral regimen. J AIDS Clin Res. 2014; 5: 358.
12. Rahmatulla S, Marshall A, Bhagani S, et al. Esophageal tuberculosis infection in a simultaneous pancreas and kidney transplant recipient. Gen Med (Los Angel). 2014; 2:144.
13. Wassie MM, Shamil F, Worku AG. Weight gain and associated factors among adult tuberculosis patients on treatment in northwest Ethiopia: a longitudinal study. J Nutr Disorders Ther. 2014; 4:143.
14. Abi-Rizk A, Beyrouthy ME, et al. The innate and adaptive immune response during M. tuberculosis infection. J Mol Genet Med. 2014; 8:124.
15. Woldeyohannes SM, Abera SY. Worldwide spatial and temporal distribution of tuberculosis (TB). J AIDS Clin Res. 2015; 6:452.
16. Bhat S, Kangoo KA, Zahoor A, et al. Concomitant pyogenic spondylodiscitis with large psoas abcess in known case of tuberculosis spine; presenting as refractory tuberculosis. J Spine. 2015;4:212.
17. Soussi Tanani D, Serragui S, Cherrah Y, et al. Signal management of disproportionate reporting in moroccan pharmacovigilance: the lower limb edema induced by anti-tuberculosis drugs. J Pharmacovigilance. 2015; 3:161.
18. Trabulo D, Teixeira C, Ribeiro S, et al. Sweet syndrome and pulmonary tuberculosis in a crohn's disease patient treated with anti-TNFa. J Gastrointest Dig Syst. 2015; 5:262.
19. Ejeta E, Chala M, Arega G, et al.Treatment outcome of tuberculosis patients under directly observed treatment of short course in Nekemte town, western Ethiopia: retrospective cohort study. Gen Med (Los Angel). 2015; 3:1000176.

20. Razvodovsky YE. Fraction of tuberculosis mortality attributable to alcohol in Russia. J Alcohol Drug Depend. 2015; 3:195.
21. Fiseha T, Gebru T, Gutema H, et al. Tuberculosis treatment outcome among hiv co-infected patients at Mizan-Aman general hospital, southwest Ethiopia: a retrospective study. J Bioengineer & Biomedical Sci. 2015; 5:139.
22. Shu L, Muhammad H, Han L, et al. The role of flexible bronchoscope in the diagnosis of the pulmonary tracheobronchial tuberculosis in children-report of four cases and review of literature. J Bacteriol Parasitol. 2015;6:223.
23. Klautau GB, Bammann RH, Ferreira NVS, et al. (2014) QuantiFERON®-TB gold in-tube is not Useful for Diagnosing Active Tuberculosis in HIV/AIDS Patients with Severe Immunodeficiency: Results from Brazil. J Trop Dis 2:150.
24. Mothé B, Antas PRZ. Revisiting the current assays associated to host immune responses against tuberculosis infection. J Anc Dis Prev Rem. 2015; 3:123.
25. Solomon S, Asmare Y, Taddesse B, et al. NPrevalence of tuberculosis among hiv positive individuals with asymptomatic disease states at St. Paul's hospital millennium medical college, Addis Ababa, Ethiopia. J Med Microb Diagn. 2015; 4:192.
26. Pandrangi A. Development of novel bacteriostatic agents against Mycobacterium tuberculosis using in silico techniques. Pharm Anal Acta. 2015; 6:374.
27. Gulich GA, Tulu KT, Worku A, et al. Molecular characterization of Mycobacterium tuberculosis complex in Gambella region, south west Ethiopia. J Med Diagn Meth. 2015; 4:175
28. Accinelli RA. Duration of isoniazid prophylaxis in HIV-infected individuals living In endemic areas of tuberculosis. J AIDS Clin Res. 2015; 6:456.
29. Babanejad M, Soroush S. Similarity in the amino acid sequences of Mycobacterium tuberculosis protein targets involved in binding sites of docking with thiacetazone. Pharm Anal Acta. 2016; 7: 509.
30. Desalegn TH, Berhanu JB. Knowledge, Attitude and practice of tuberculosis and its transmission among high school students in Yirgacheffe town, Gedeo Zone, Southern Ethiopia. J Infect Dis Preve Med. 2016; 4:142.
31. Divya R, Max R O'Donnell, Allan MW-F, et al. Discordance between tuberculin skin test and interferon gamma release assay is associated with previous latent tuberculosis infection treatment. Mycobact Dis. 2016; 6:227.
32. Avilez C, Verdugo Martinez O, Encina C, et al. Effectiveness of clinoptilolite zeolite for mycobacterium avium subsp. paratuberculosis (map) control in dairy slurry. Mycobact Dis. 2016; 6:226.
33. Kalyan Kumar PV, Ramakrishna G, Ramakrishna R. Prospective study of moxifloxacin prophylaxis in patients suffering with hiv having contact history of multidrug resistant tuberculosis (MDR-TB). J Pulm Respir Med. 2016; 6:377.
34. Araya M, Seleshe N, Tadesse G, et al. Magnitude of presumptive tuberculosis cases, in the rural communities of north western and north eastern parts of amhara regional state, Ethiopia. Clin Microbiol. 2016; 5:261.
35. Aweke K,Gashaw G. Prevalence of avian tuberculosis in domestic chickens in selected sites of Ethiopia. J Vet Sci Technol. 2016; 7:377.
36. Joshi SD, Aminabhavi TM. Pyrrole analogs as novel organic molecules to combat tuberculosis. J Pharma Care Health Sys. 2016; 3:e143.
37. Hirama T, Minezaki S, Kanazawa M, et al. The quantiferon®-tb gold in-tube assay detects interferon-? release responses to Mycobacterium tuberculosis antigens for extended periods of time. J Mycobac Dis. 2016; 6:225.
38. Radzikowska E, Blasinska-Przerwa K, Skronska P, et al. Lymphangioma in patients with pulmonary lymphangioleiomyomatosis: results of sirolimus treatment. J Cancer Sci Ther. 2016; 8: 233-239.

39. Ahmad V, Sidiq Z, Vashishtha H, et al. Additional resistance to moxifloxacin and levofloxacin among mdr-tb patients with base line resistance to ofloxacin at a reference laboratory. J Biotechnol Biomater. 2016; 6:239.
40. McGee WT, Singh M. Mycobacterium tuberculosis presenting as septic shock with ARDS: multiculturalism promotes early therapy. Lung Dis Treat. 2016; 2:115.
41. Nohaji W, Sokhela N, Nonkelela N. Directly observed treatment strategy still a challenge in tuberculosis control: The South African plight. J Comm Pub Health Nurs. 2016; 2:136.
42. Gupta RK, Srivastava S, Srivastava BS, et al. Defining new drug targets through protein-protein interaction: interaction of resuscitation promoting factors with suca of tca cycle in M. tuberculosis H37Rv. J Pulm Respir Med. 2016; 6:363.
43. AL-Harbie A, Sadek A, Picozzi K, et al. Migration and related epidemiological risk factors associated with unavoidable increments of tuberculosis morbid indicators in Kuwait. Epidemiology. (Sunnyvale) 2016; 6:257.
44. Malinga LA, Stoltz A, Van der Walt M. Efflux pump mediated second-line tuberculosis drug resistance. Mycobact Dis. 2016; 6:222.
45. Ferdaous Y, Maher A. Spinal tuberculosis. Mycobact Dis. 2016; 6:221.
46. Albana R, Purba JA, Manihuruk H, et al. Cemented total hip arthroplasty for neglected tuberculosis of the hip in endemic area (Papua, Indonesia): A Case Report. J Clin Case Rep.2016; 6:835.
47. Patil J. Use of biomarkers in tuberculosis treatment: a challenging approach. J Pharmacovigil. 2016; 4:e162.
48. Wang T, Zhang N, Liu J,et al. Tuberculous pseudoaneurysm of descending abdominal aorta in association with tuberculosis of spine: a rare complication. J Vasc Med Surg. 2016; 4:279.
49. Mehta PK. Immuno-PCR: It's role in serodiagnosis of tuberculosis. Mycobact Dis. 2016; 6: 219.
50. Worku A, Abreham S, Hailu M, et al.Cross-Sectional study and comparison of different diagnostic methods of bovine tuberculosis in Gondar Elfora Abattoir, Ethiopia. Mycobact Dis. 2016; 6:218.
51. Rosado-Quiab U, Cedillo-Rivera RM, Cabrera-Gaytan DA, et al. Influence of family system characteristics on adherence to directly observed treatment, short-course (dots) in pulmonary tuberculosis-a cohort study. J Mycobac Dis. 2014; 4:166.
52. Mboowa G. Tuberculosis and genetics of sub-saharan africa human population. J Mycobac Dis. 2014; 4:164.
53. Cheepsattayakorn A, Cheepsattayakorn R. Malaria with pulmonary complications. Poult Fish Wildl Sci. 2014; 2:120.
54. Cheepsattayakorn A. New emerging human parasites in 21th century. Poult Fish Wildl Sci. 2014; 2:118.
55. Rodriguez Plaza JG, Rivas-Santiago B, Hernandez-Pando, Rio GD. Prospective tuberculosis treatment: peptides, immunity and autophagy. J Mol Genet Med. 2014; 8:128.
56. Onal CO, Kibaroglu E. Pulmonary tuberculosis caused by immunosuppressive treatment. J Clin Case Rep. 2014; 4:383.
57. Abebe F. The role of t cells in mucosal immunity against Mycobacterium tuberculosis (mtb) infection: a review of current understanding. J Clin Cell Immunol. 2014; 5:254.
58. Earla P. Tuberculosis: a terrible transmitted disease. J Mycobac Dis. 2014; 4:R1-001.
59. Sandle T. The possible origins of tuberculosis in South America. J Anc Dis Prev Rem. 2014; 2:e116.
60. Sha W, Xiao H. Rational use of anti-tuberculosis drugs in the chemotherapy era of drug-resistant tuberculosis. J Mycobac Dis. 2014; 4:163.
61. Cheepsattayakorn A, Cheepsattayakorn R. Tuberculosis in association with human leukocyte antigen. J Mycobac Dis. 2014; 4:161.

62. Xerinda S, Neves N, Santos L, et al. Endotracheal tuberculosis and aspergillosis co-infection manifested as acute respiratory failure: a case report. J Mycobac Dis. 2014; 4:160.
63. Fatnassi R, Mkinini I, Kaabia O, et al. Breast tuberculosis report of two cases. Gynecol Obstet (Sunnyvale). 2014; 4:229.
64. Uzoewulu NG, Ibeh IN, Lawson L, et al. drug resistant Mycobacterium tuberculosis in tertiary hospital south east, Nigeria. J Med Microb Diagn. 2014; 3:141.
65. Abebe A, Etana B, Tsadik M, et al. Assessing the effect of highly active anti-retroviral treatment and associated factors on incidence of tuberculosis among adult hiv positive individuals in Assela, Ethiopia. J Health Med Informat. 2014; 5:156.
66. Banu A, Rathod V. Biosynthesis of monodispersed silver nanoparticles and their activity against Mycobacterium tuberculosis. J Nanomed Biotherapeut Discov. 2013; 3:110.
67. Öztug Önal C, Kibaroglu E. Evaluation of patients undergoing latent tuberculosis treatment in ankara no. 4 tuberculosis dispensary between 1981-2011. Intern Med. 2014; 4:160.
68. Pingle P. Application of bleach concentration method in tissue samples received for diagnosis of extra pulmonary tuberculosis diagnosis. J Med Microb Diagn. 2014; 3:168.
69. Das S. Changing trend of surgery in pulmonary tuberculosis. J Pulm Respir Med. 2015; 5:225.
70. Amaral L. The world must seriously consider with urgency the use of thioridazine in combination with conventional antibiotics for therapy of extensively drug resistant pulmonary tuberculosis: therapy proven effective in Argentina. Mycobact Dis. 2014; 4:e130.
71. Gupta AK, Singh A, Singh S. Glycogenomics of Mycobacterium tuberculosis. Mycobact Dis. 2014; 4:175.
72. Damtie D, Woldeyohannes D, Mathewos B. Review on molecular mechanism of first line antibiotic resistance in Mycobacterium tuberculosis. Mycobact Dis. 2014; 4:174.
73. Fujiwara H, Nishimura T, Iketani O, et al. Discordance between two interferon-gamma release assays in the diagnosis of latent tuberculosis infection in healthcare workers. J Infect Dis Ther. 2014;2:171.
74. Amaral L, Soolingen D. Advances in personalised treatment of multi-drug resistant tuberculosis. Biochem Pharmacol (Los Angel). 2014; 3:148.
75. Veras AAO, Sá PHCG, Pinheiro KC, et al. Efficiency of corynebacterium pseudotuberculosis 31 genome assembly with the Hi-Q enzyme on an ion torrent PGM sequencing platform. J Proteomics Bioinform. 2014; 7:374-378.
76. Dan X, Feng L, Wang W, et al. Abdominal tuberculosis leading to prehepatic portal hypertension: a case report. J Cytol Histol. 2014; 5:278.
77. Akhtar K, Ahmad M, Waris A, et al. Primary conjunctival tuberculosis-a rare presentation. J Med Surg Pathol. 2016; 1: 124.
78. Germanovna DE (2016) Treatment of tuberculosis by preparation sangviritrins without resistance occurrence mycobacteruim. Transl Med. 2016; 6: 174.
79. Elhag NI, Eltahir EAG, Elhassan AM, et al. Drug resistant Mycobacterium tuberculosis complex isolates among patients with tuberculous lymphadenitis . J Infect Dis Preve Med. 2016; 4:130.
80. Ba ID, Thiongane A, Ba A, et al. Immune reconstitution inflammatory syndrome (iris) in a child with disseminated tuberculosis. Interdiscip J Microinflammation. 2015; 3:134.

81. Waghmare P, Wankhade G, Jena L, et al. Excretory secretory proteins released during growth of mycobacterium tuberculosis (h37ra), with diagnostic potential in pulmonary and extra pulmonary tuberculosis. Mycobact Dis. 2016; 6:215.
82. Parandhaman DK, Hassan S, Narayanan S. Multifaced pkne: apoptosis inhibition, hiv co-infection, host signaling cross-talk and in orchestrating the physiology of Mycobacterium tuberculosis. J Microb Biochem Technol. 2016; 8:231- 235.
83. Sinha S, Raghunandan P, Pradhan R, et al. The comparison of conventional and novel fixed dose combination of rifampicin and isoniazid to improve bioavailability of rifampicin for treatment of tuberculosis. J Mycobac Dis. 2014; 4:157.
84. Tamura A, Hebisawa A, Shimada M, et al. Epithelioid cell granuloma detection in the sputum of patients with pulmonary tuberculosis. J Mycobac Dis. 2014; 4:158.
85. Amado CA, Ferrer DJ, Agüero R, et al. Clinical, radiological and inmunological features in children with pulmonary tuberculosis: a review. J Mycobac Dis. 2014; 4:159.
86. Ballo RM, Veenstra B, Simon DM, et al. Intestinal tuberculosis in a liver transplant patient. J Clin Case Rep. 2014; 4:364.
87. Nair D, Palanivel C. New WHO guidelines on symptom based childhood contact screening for tuberculosis: relevance to national tuberculosis program of India. J Pulm Respir Med. 2014; 4:195.
88. Shital P, Anil J, Sanjay M, et al. Tuberculosis with diabetes mellitus: clinical-radiological overlap and delayed sputum conversion needs cautious evaluation-prospective cohort study in tertiary care hospital, India. J Pulm Respir Med. 2014; 4:175.
89. Mungrue K. Tuberculosis in Trinidad a small developing country: will we reach the millennium development goal 8 (mdg8) as we countdown to 2015? J Anc Dis Prev Rem. 2014; 2:112.
90. Aye M, Cabot JSF, Baba S, et al. Disseminated tuberculosis - a case study. J Metabolic Synd. 2014; 3:140.
91. van de Wetering D, Van Vonderen MGA, Al Moujahid A, et al. Addison's disease as presenting symptom of infection with M. tuberculosis. Clin Microbial. 2014; 3: 152.
92. Asemahagn MA. Assessing the quality of tuberculosis laboratory services in selected public and private health facilities in western Amhara, Ethiopia. J Med Diagn Meth. 2014; 3:158.
93. Wang RA, Ke ZY, Liang Y, et al. Why is Mycobacterium tuberculosis hard to grow? The principle of biorelativity explains. J Clin Exp Pathol. 2014; 4:176.
94. Rasaki SO, AJibola AA, Musa SA, et al. Rifampicin resistant tuberculosis in a secondary health institution in Nigeria, West Africa. J Infect Dis Ther. 2014; 2:139.
95. Sharma S, Madan M. Detection of mutations in rpob gene of clinically isolated M. tuberculosis by DNA sequencing. J Mycobac Dis. 2014; 4:156.
96. Albarouni AS, Aboguttaia NB, Alamri WM, et al. Drug susceptibility patterns of Mycobacterium tuberculosis isolated from patients with pulmonary tuberculosis in tripoli-libya. J Mycobac Dis. 2014; 4:154.
97. Birkenkamp KE, Lauzardo M, Mangura BT, et al. Diagnosis and management of tuberculosis in candidates for tumor necrosis factor alpha antagonists: an experts survey. J Mycobac Dis. 2014; 4:171.
98. Liu J, Ryan D, Wei T, et al. Evaluation of vitamin D level and fatigue in acute leukemia patients undergoing chemotherapy. JLeuk. 2015;3:194.

99. Sharma RK, Puri V, Mutreja D, et al. Applicability of a single 5 color cytoplasmic markers tube as primary panel in routine immunophenotyping of acute leukemia. J Blood Disord Transfus. 2015;6:309.
100. Tanyildiz HG, Malbora B, Yesil S, et al. Vitamin b12 deficiency mimicking acute leukemia in a child. J Clin Case Rep. 2014;4:430.