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Bacteriological Study of Diabetes Foot Ulcer

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Abstract:

Diabetes is a long life disease in which the sugar level is increased in blood. Diabetes contains the one of the most complication disease that is Diabetic foot ulcer. Diabetes foot ulcer is one of the major medical, social and economic complications of Diabetes mellitus and this infection has polymicrobial nature. Diabetes foot ulcer infections have the optimal treatment in which the type of foot ulcer infection is recognized and pathogen-appropriate antibiotic therapy is suggested. In case of non-recognizable and uncontrolled of foot ulcer diabetes, it can be leads to many devastating consequences like limb amputation, sepsis, and even mortality and hospitalized. In this review paper, we studied about the bacteriological profile of Diabetes Foot Ulcers.

Keywords: *Diabetes Mellitus, Foot Ulcer Diabetes, Polymicobial, Pathogen*

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Introduction

A diabetic foot is one of the most complicated of diabetes that leads to cause hospitalization among diabetic patients (Shanmugam, Jeya and Linda, 2013). According to World Health Organization (WHO), this disease widespread with an increasing incidence and peoples are afflicted approximately 150,000,000 across the world. Diabetic Foot is referred to as infection and ulcers that is accompanied by neuropathy and arteriovnous abnormalities in the foot of patients with diabetes (Sheikh *et al.*, 2014). Neuropathy, peripheral vascular disease, foot ulceration and infection with or without osteomyelitis are pathological complication that is diseases of Diabetic Foot Disease and this disease leads to the development of gangrene and necessitates limb amputation. Approximately 57 million Indian peoples will affected by Diabetes in the year of 2025. Individuals contain diabetes have at least 10 fold greater risk that leads to being hospitalization for soft tissue and bone infection of foot other than without diabetes (Shanmugam, Jeya and Linda, 2013).

In patients, damaging of the micro-vascular circulation with a diabetic foot limits the access of phagocytes due to which development of an infection increases. In lower extremities, the blood supply is compromised by local injuries and improper foot wear but foot infection with diabetes are initially treated empirical in patients, a therapy which is directed at the known causative organism may improve the outcome (Sheikh *et al.*, 2014).

Many studies have been reported before 25 years ago on bacteriology of Diabetic Foot Infections (DFIs) but its result have been diverse and contradictory. The differences in the positive organism causes discrepancies, which had happen overall period of time, variation in a geographical region on the infection type or severity as were stated in various studies. Bacterial infections are mixed by diabetic foot infection and requires the proper management of these infection by an appropriate antibiotic selection, based on the culture and the antimicrobial susceptibility testing (Shanmugam, Jeya and Linda, 2013).

Based on severity and depth of ulcers, different microorganisms are isolated from diabetic foot infections. In superficial ulcer, gram-positive cocci are the most common germs but anaerobic bacteria are mostly found in deeper lesions. The existence of different type of microorganism along with the growing resistances to antibiotic therapy has literally compromises the therapy of empiric in diabetic food infection (Sheikh *et al.*, 2014).

Important contributor to the chronicity of wounds are the diversity of bacterial populations in chronic wounds such as diabetic foot ulcers that are beginning with the medical and research communities. Major populations of bacteria are examined that were associated with the bio burden of infected diabetic foot ulcers. Survey was performed on the wounds in which identification of the genera or the noted pathogens that were present in the diabetic ulcers. This survey also notes down the changes in the bacteriological profiles of the infected foot ulcers and comparison was done from previous studies (Shanmugam, Jeya and Linda, 2013).

Polymicrobial infection involving gram negative and obligate anaerobic organisms are likely to occur in other patients. For the treatment of diabetic foot ulcers, using the antibiotic therapy in which need to be guided appropriately in the light of causative organism and its sensitive pattern to various drugs and calls upon a well-planned bacteriological study of diabetic foot ulcers (Patil and Mane, 2017).

Currently, there is a paucity of data on the ESBL that is carbapenemase producing organisms from diabetic foot infections, especially in this part of world (Shanmugam, Jeya and Linda, 2013).

Treatment of Diabetic Foot Ulcer

Controlling the hyperglycemic burden whose patients presenting with the Diabetic Foot Ulcer (DFU) by calling up to "the Triad". This triad is a wide spectrum antimicrobial chemotherapy including a 3rd generation Cephalosporin Ceftriaxone, a 2 generation fluoroquinolone and Ciprofloxacin and Lincosamide class, Clindamycin. This triad was given together with a periods of two weeks.

In case the required result are not achieved with the triad then, decision of doing a culture and sensitivity test for all patients before starting the empirical antibiotic Triad is done.

Our Inclusion Criteria Included:

- Without osteomyelitis, positive diagnosis of infected diabetic ulcer.
- During 3-months periods, ability to attend the clinic visits.
- Lab tests confirming active infection (Complete Blood Count (CBC) with high Thin Layer Chromatography (TLC), Erythrocytes Sedimentation Rate (ESR) and C-reactive Protein (CRP))
- Acceptance for a written consent

The Exclusion Criteria were:

- According to Infectious Diseases Society of American Classification, patients with severe infection causing remarkably disability.
- Presence of Osteomyelitis.
- Patients with moderate to severe renal impairment.
- Patients with moderate to severe Peripheral Arterial Disease (PAD) that was clinically diagnosed by absence of both distal pulse and confirmed by Duplex study.

Antibiotic Susceptibility Testing: By using disc diffusion method, all bacteria isolates were tested for antibiotic susceptibility against selected members of the following groups: Amikacin, Gentamycin, Clindamycin, Amoxicillin/ Clavulanate, Azithromycin, Ceftazidime, Cefotaxime, Cephalexin, levofloxacin, Ciprofloxacin Ofloxacin, Piperacillin/Tazobactam, Dicloxacillin, Ipipenem, Ampicillin/sulbactam, Chloramphenicol and Penicillin. According to Kirby-Bauer technique, measuring the diameters of inhibition zones in millimeters for estimated the sensitivity (Sheikh et al., 2014).

Methicillin-resistant Staphylococcus Aureus (MRSA) Detection: By using a cefoxitin (30 µg) disc, phenotypic test for the detection of MRSA was done. In case of equal to or more than 22mm of cefoxitin then organism was reported to as Methicillin Sensitive Staphylococcus aureus while cefoxitin is less or equal to 21mm were reported as Methicillin Resistant Staphylococcus aureus (MRSA) (Shanmugam, Jeya and Linda, 2013).

Review of Literature

Citron (2007) dictated that failure to treat appropriately patients with these potentially limb-threatening infections can result in a poor outcome. This study showed moderate to severe diabetic foot infection in patients that are not received antibiotic therapy, specifically these study are polymicrobial with mixed gram negative and gram positive species and in average form, 2.7 aerobic bacteria and 2.3 anaerobic bacteria per culture-positive specimens.

Alsaimary (2010) concluded that greater found of aerobic and anaerobic bacterial infections/pathogens from diabetic patients. These paper are finding that lycos in which increase the risk by abnormally high levels of blood sugar in diabetic patients which damage the blood vessels, causing to thicken and leak etc. Poor circulation result is leads to ulcers that is located in the feet, these ulcers are slow to heal and frequently become deep and infected. This study done the comparison of bacterial wound infection in diabetic patients with non-diabetic patients. It's indicated the high blood sugar can increase infection rate and impair wound healing and wound inflammation and infections can elevate blood sugar.

Shanmugam, Jeya and Linda (2013) in this review paper, diabetic foot infections are caused by both gram positive cocci and gram negative bacilli and show the greater importance of gram negative bacilli. The pattern of antibiotic susceptibility are isolated from diabetic foot infections that is crucial planning for treatment of this disease.

Sheikh (2014) stated that identify the bacterial pathogens that is associated with diabetic foot ulcer and find out the antibiotic susceptibility pattern in a limited number of patients. Within the 3 months of period, improve the rate of ulcer (through various criteria). Form diabetic foot infections, knowledge of antibiotic susceptibility pattern of the isolates that is imperative for planning of the appropriate treatment.

Simonsen *et al.* (2015) stated that hospitalization as well as infections treated in outpatient setting is caused by the infectious disease. In this review paper, observed that bacterial infections were more common in patients with type I diabetes. Reported use of antibiotics and frequency of bacterial infection were basically associated in diabetic patients having an increased risk of incident microalbuminuria. It show the result with type I diabetes that increase the risk of less severe infections, can be treated outside the hospital. It is observed that diabetic nephropathy at all stages as a risk factors for bacterial infections. Microalbuminuria did not increase the rate of hospitalization due to bacterial infections but in case of macroalbuminuria, double the rate that is compared with patients with normal AER.

Jneid *et al.* (2017) stated that difficulties of differentiating infection from colonization, importance of accurate sampling and transport to laboratory and limits of both culture and molecular based methods to give a good representative of the pathogenic bacterial burden. In this review paper, not only include bacteria but also includes viruses, protozoans and fungi attached to biotic surfaces that display specific inter-microbial and host interactions.

Patil and Mane (2017) within the population of people, high occurrence of foot ulcers with diabetes. Foot ulcerations may lead to infection, lower extremity amputation and cause of disability to patients which result in significant morbidity, extensive periods of hospitalization and mortality. A provided of high standard of care and appreciation of causative organism in diabetic foot.

Conclusion

Foot ulcers occur at high level within the population of people with diabetes. It leads to infection, lower extremity amputation and are the major cause of disability to patients that resulting in morbidity, extensive periods of hospitalization and mortality. These diabetic foot infections are caused by both gram positive cocci and gram negative bacilli. This review studies conclude that there is need to provide the high standard of care and appreciation of causative organisms in diabetic foot. The treatment of diabetic foot ulcer infection is done by the study of antibiotic susceptibility pattern of isolates from the diabetic foot infection.

References:

Abdulkareem, Ihsan Edan. "*Bacterial Wound Infections in Diabetic Patients and Their Therapeutic Implications.*" Bacterial Wound Infections in Diabetic Patients and Their Therapeutic Implications, 1(2), 0 June 2010, pp. 12–15. Available at: http://www.academicjournals.org/mpr.

Citron, D. M., *et al.* "*Bacteriology of Moderate-to-Severe Diabetic Foot Infections and In Vitro Activity of Antimicrobial Agents.*" Journal of Clinical Microbiology, vol. 45, no. 9, Mar. 2007, pp. 2819–2828.

El-Sheikh, Nora A., *et al.* "*Bacteriology of Diabetic Foot Ulcer among an Egyptian Population: A Retrospective Study.*" Bacteriology of Diabetic Foot Ulcer among an Egyptian Population: A Retrospective Study, 2014, pp. 494–502.

Lipsky, B. A., *et al.* "*Diabetic Foot Ulcer Microbiome: One Small Step for Molecular Microbiology. One Giant Leap for Understanding Diabetic Foot Ulcers?"* Diabetes, vol. 62, no. 3, 2013, pp. 679–681.

neida, J., *et al.* "*Human Microbiome Journal.*" Human Microbiome Journal, 7 Nov. 2017, pp. 1–6.

Patil, Swati V., and Roshan R. Mane. "*Bacterial and Clinical Profile of Diabetic Foot Ulcer Using Optimal Culture Techniques.*" International Journal of Research in Medical Sciences, vol. 5, no. 2, 2017, p. 496.

Riaz, Samreen. "Diabetes Mellitus." Diabetes Mellitus, 4(5), May 2009, pp. 367–373., www.academicjournals.org/SRE.

Shanmugam, Priyadarshini. "*The Bacteriology of Diabetic Foot Ulcers, with a Special Reference to Multidrug Resistant Strains.*" JOURNAL of CLINICAL AND DIAGNOSTIC RESEARCH, 2013, doi:10.7860/jcdr/2013/5091.2794.

Simonsen, Johan R, *et al.* "*Bacterial Infections in Patients with Type 1 Diabetes: a 14-Year Follow-up Study."* BMJ Open Diabetes Research & Care, vol. 3, no. 1, 2015.

Son, Seung Tae, *et al.* "*The Microbiology of Diabetic Foot Infections in Korea*." The Microbiology of Diabetic Foot Infections in Korea, 13 (1), May 2017, pp. 8–12.