A STUDY OF THE BACTERIOLOGICAL PROFILE OF DIABETIC FOOT ULCER AND ANTIBIOTIC SENSITIVITY PATTERNSajila Nalakath Mukkunnath¹, R. Manjunath², Mahesh Desai³**HOW TO CITE THIS ARTICLE:**

Sajila Nalakath Mukkunnath, R. Manjunath, Mahesh Desai. "A Study of the Bacteriological Profile of Diabetic Foot Ulcer and Antibiotic Sensitivity Pattern". Journal of Evolution of Medical and Dental Sciences 2015; Vol. 4, Issue 39, May 14; Page: 6832-6840, DOI: 10.14260/jemds/2015/991

ABSTRACT: INTRODUCTION: Diabetic foot infection is the most common cause of morbidity and mortality in diabetic patients. Appropriate antibiotic therapy is required to reduce complication.

AIMS AND OBJECTIVES: To study the bacteriological profile of diabetic foot ulcer and antibiotic sensitivity pattern of organisms.

MATERIALS AND METHODS: A retrospective study was conducted in 290 patients presented with diabetic foot ulcer, in KIMS hospital in the year of 2013. Swab technique was used to collect samples.

RESULTS: A total of 372 was isolates obtained from 290 patients. Mono-microbial infection was found to be more than poly-microbial infection. Gram negative bacilli was found to be more prevalent than gram positive cocci. The commonest isolate was Pseudomonas (23.7%), followed by klebsiella (21.7%). The commonest gram positive organisms was enterococcus (17.5%), followed by Staphyococcus aureus (16.6%). Pseudomonas showed multidrug resistance. None of the cocci were resistant to vancomycin. **CONCLUSION:** Diabetic foot ulcers are one of the most common cause of hospitalization in diabetic patients, appropriate antibiotic therapy is essential to prevent complications in these patients. Wound infection begin superficially, but with delay in treatment and impaired body defense can lead to catastrophic outcome.

KEYWORDS: Diabetic Foot Ulcer.

INTRODUCTION: Diabetic foot infection is both a common and potentially disastrous complication that can progress rapidly to irreversible septic gangrene necessitating amputation of the foot.¹ Diabetic foot infections range in severity from superficial paronychia to deep infection involving bone. They are associated with increased frequency and length of hospitalization. Foot ulceration and infection are the leading causes of morbidity and mortality in diabetes.

Patients with diabetes are particularly susceptible to foot infection primarily because of neuropathy, vascular insufficiency, and diminished neutrophil function. Peripheral neuropathy has a central role in the development of a foot infection. Patients with diabetes lose the protective sensations for temperature and pain, impairing awareness of trauma such as abrasions, blistering, or penetrating foreign body. Once the skin is broken (Typically on the plantar surface), the underlying tissues are exposed to colonization by pathogenic organisms. The resulting wound infection may begin superficially, but with delay in treatment and impaired body defense mechanisms caused by neutrophil dysfunction and vascular insufficiency, it can spread to the contiguous subcutaneous tissues and to even deeper structures.²

Many studies have done on the bacteriology of Diabetic Foot, but the results have been varied and often contradictory.³ These discrepancies could partly have been due to the differences in the causative organisms, which had occurred over time, geographical variations, or the type and the severity of the infection.³

ORIGINAL ARTICLE

The proper management of these infections requires early recognition and appropriate antibiotic selection based on culture and antimicrobial susceptibility results and quick initiation of appropriate antibiotic therapy. The aim of current study was to determine the relative frequency of bacterial isolates provided from culture of diabetic foot. We have also included antimicrobial susceptibility tests for commonly used antimicrobial agents to assess the prevalence of antimicrobial resistant patterns within these organisms.

MATERIALS AND METHODS: This retrospective study was conducted in patients admitted with diabetic foot in KIMS Hospital Bangalore, from January 2013 - December 2013. 290 diabetic foot patients were included in the study. Majority of them were males.

Samples were collected from the deeper portion of the ulcers using sterile swabs. The samples were collected after cleaning the ulcer to avoid skin contaminants. A direct Gram stained smear of the specimen was examined. The specimens were inoculated onto blood agar, chocolate agar and Mac Conkey's agar. The inoculated plates were incubated at 37°C overnight and the plates were examined for growth, the next day. Further processing was done according to the nature of the isolate, as was determined by Gram staining and the colony morphology. The organisms were identified on the basis of their Gram staining properties and their biochemical reactions.¹

Antibiotic Susceptibility Testing: The antibiotic susceptibility testing was done by the Kirby Bauer disc diffusion method. Three types of anti-microbial discs were used. The disc for gram negative organism contained Ampicillin (10mcg), Gentamicin (10mcg), Amikacin (30mcg), Cefuroxime (30mcg), Cefepime (30mcg), Piperacillin/tazobactam (100/10mcg), imipenem (10mcg), Ciprofloxacin (5mcg), levofloxacin (5mcg), cefoperazone (75mcg), amoxycylav (10mcg), cotrimoxazole (25mcg).

The disc for gram positive cocci contained amoxycylav (10mcg), cotrimoxazole (25mcg), tetracycline (30mcg), erythromycin (15mcg), cefoperazone (75mcg), cefipime (30mcg), cloxacillin (5mcg), Gentamicin (10mcg), Ofloxacin (5µg), ciprofloxacin (5mcg) clindamycin (2mcg), linezolid (30 mcg) vancomycin (30mcg).

Third disc was used for multi-drug resistant organisms. It contained Meropenem (10 mcg), Netiillin (30mcg), Amikacin, piperacillin-tazobactum, gentamicin, amoxycylav, imipenem, levofloxacin, tobramycin (10mcg), Cefuroxime, ceftriaxone/tazobactum (30/10mcg), cefepime, Antibiotic sensitivity was determined by measuring zone of inhibition.

RESULTS: In the present study, 290 patients were included. the age of the patients ranged from 25 to 80 years.210 patients were males.80 patients were females.In this study diabetic foot infection was most prevalent in the age group 60-70 years.45% of females and 41% of males were in the age group of 60-70 years, 25% of females and 22.4% of males were in the age group of 50-60 years.18.57% males and10% females were in the age group of 70-80years.

	Organism	Total number of isolates	%
1	Pseudomonas	39	22.6%
2	Staphylococcus aureus	36	20.9%
3	Klebsiella spp	28	16.3%

ORIGINAL ARTICLE

4	Enterococcus	24	14%
5	Acinetobacter SPP	15	8.7%
6	Escherichia coli	9	5.2%
7	Citrobacter	7	4.1%
8	NFGNB	5	2.9%
9	Proteus mirabilis	5	2.9%
10	CONS	2	1.16%
11	Streptococcus pyogenes	1	0.6%
12	Enterobacter	1	0.6%

Table 1: Organism isolated (Monomicrobial infection)

Age	Male	%	Female	%
20-30	1	0.47	1	1.25
30-40	6	2.86	4	5
40-50	28	13.34	9	11.25
50-60	47	22.38	20	25
60-70	86	41	36	45
70-80	39	18.57	8	10
80-90	3	1.43	2	2.5

Table 2: age and sex distribution

A total of 372 bacterial isolates were obtained from 290 patients with diabetic foot ulcers. 88(30.3%) samples revealed poly microbial etiology. 172(59.3%) samples revealed mono bacterial etiology. 30(10.3%) samples yielded no growth. Majority were, gram negative bacilli. The commonest isolate was Pseudomonas (23.7%), followed by klebsiella (21.7%). The commonest gram positive organisms which were isolated were Enterococcus (17.5%), followed by staphylococcus aureus (16.6%). The other isolates were Acinetobacter (8.6%), Proteus mirabilis (6.6%), Citrobacter (5.9%) and E. coli (11.38%), Enterobacter (3.4%), non-fermenting gram negative bacilli (4%), CONS-coagulase negative staphylococci (1%), streptococcus pyogenes (0.6%)

In monobacterial infections the most common isolate was pseudomonas (22.6%), followed by staph. aureus (20.9%)

The other isolates were klebsiella (16.3%), Enterococci (14%). Acinetobacter (8.7%), E. coli (5.2%), citrobacter (4.1%), NFGNB (2.9%) proteus (2.9%), CONS (1.16%), streptococcus pyogenes and Enterobacter (0.6% each).

In polymicrobial infections, the most common isolates were klebsiella (39.6%), followed by pseudomonas (34%). the most common gram positive cocci isolated were Enterococci (30.6%), followed by staph aureus (13.6%). The culture also yielded E. coli (27.27%), proteus (15.9%), citrobacter (11.3%).

Acinetobacter (11.3%), Enterobacter (10.2%) NFGNB (7.9%), CONS and s. pyogenes (1.1%) each.

ORIGINAL ARTICLE

Organism		No. of isolates	%
Klebsiella	Enterococci	10	11.3
	Acinetobacter	2	2.3
	Ecoli	7	7.9
	Enterobacter	1	1.1
	Proteus	3	3.4
	NFGNB	2	2.3
Pseudomonas	Klebsiella	10	11.3
	Citrobacter	5	5.7
	Ecoli	5	5.7
	Staph aureus	4	4.5
	Proteus	2	2.3
	Enterobacter	1	1.1
	NFGNB	1	1.1
Enterococcus	Acinetobacter	4	4.5
	Ecoli	3	3.4
	Citrobacter	4	4.5
	Staphylococcus aureus	2	2.3
	Proteus	2	2.3
	Enterobacter	1	1.1
Ecoli	Citrobacter	1	1.1
	Acinetobacter	3	3.4
	Proteus	2	2.3
	Enterobacter	1	1.1
	Staphylococcus aureus	2	2.3
Enterobacter	Staphylococcus aureus	1	1.1
	Proteus	1	1.1
	Acinetobacter	1	1.1
	Streptococcus pyogene	1	1.1
NFGNB	Staph.aureus	1	1.1
	CONS	1	1.1
Pseudomonas	Proteus+ staph.aureus	1	1.1
	Enterococci + proteus	1	1.1
Enterobacter	Proteus +NFGNB	1	1.1
Staphylococcus aureus	Proteus + NFGNB	1	1.1

Table 3: Organism isolated (poly microbial infection)

ORIGINAL ARTICLE

Antibiotic Sensitivity Pattern: 20.8% of staphylococcus aureus showed sensitivity to Amoxyclav, 70.8% to oxacillin, 62.5% to cefipime, and 100% to vancomycin and tetracycline. 29.2% of staph. aureus found to be MRSA. 68.6% of Enterococci found to be sensitive to amoxyclav, 60.8% to cefipime and oxacillin. 96.1% to linezolid and tetracycline and 100% to vancomycin. CONS found to be 100% sensitive to vancomycin, tetracyclin, linezolid and 100% resistant to erythromycin. Streptococcus pyogenes found to be 100% sensitive to all antibiotics.

Antibiotics	Staphylococcus aureus	CONS	Entero cocci	Strepto coccus pyogene
Amoxyclav	20.8	66.7	68.6	100
Clindamycin	79.2	100	39.2	100
Cefaperazone	83.3	100	64.7	100
Ofloxacin	79.2	66.7	52.9	100
Cefepime	62.5	66.7	60.8	100
Oxacillin	70.8	66.7	60.8	100
Lomefloxacin	87.5	33.3	60.8	100
Erythromycin	66.7	0	56.9	100
Gentamicin	79.2	66.7	60.8	100
Tetracycline	100	100	96.1	100
Llinezolid	95.8	100	96.1	100
Vancomycin	100	100	100	100

Table 4: Antibiotic sensitivity pattern (gram positive cocci)

74% of pseudomonas found to be sensitive to meropenem, 92.8% to piperacillin - tazobactam, 90% to imipenem, 78.3% to amikacin, and 90% to levofloxacin. 66.7% of klebsiella were sensitive to piptaz, 87.3% to amikacin, 58.7 % to cefepime, 92.6% to levofloxacin. 80% of acinetobacter, found to be sensitive to amikacin, 32% to imipenem 80% to piptaz, 32% to ciprofloxacin and 92.6% to levoflox. 73.7% of proteus spp showed sensitivity to amikacin, and 100% sensitive to imipenem, levofloxacin, piptaz, cefepime. 90% of enterobacter species found to be sensitive to meropenem, piptaz, levofloxacin, tobramycin, and showed 100% sensitivity to amikacin. 88.2% of citrobacter spp found to be sensitive to amikacin, piptaz and levofloxacin and 82.3% to imipenem. 12% of E-coli found to be resistant to meropenem, tobramycin, netilmicin. 91% of E-coli showed sensitivity to amikacin, 88% to piptaz, and 100% to levofloxacin.

Antibiotics	Pseudomonas	Klebsiella	Acinetobacter	Proteus	Enterobacter	citro-bacter	Ecoli
Amikacin	78.3	87.3	80	73.7	100	88.2	90.9
Amoxyclav	4.3	6.3	20	26.3	10	11.8	21.2
Ampicillin	-	6.3	16	26.3	10	11.8	21.2
Cefoperazone	-	31.7	24	68.4	60	35.3	45.5
Cefipime	63.7	58.7	40	100	60	82.3	60.6
ciprofloxacin	-	38	32	68.4	70	53	49.5
Cefuroxime	23.2	33.3	24	84.2	30	29.6	45.5
Cotrimoxazole	-	27	24	52.6	40	41.2	54.5

ORIGINAL ARTICLE

Gentamicin	72.5	84	48	73.7	70	82.3	91.9
Imipenem	90	84	32	100	60	82.3	85
Levofloxacin	90	92.6	92	100	90	88.2	100
Piperacillin + Tazobactam	92.8	66.67	80	100	90	88.2	88
Meropenem	74	-	-	-	90	-	-
Tobramycin	68.2	-	-	-	90	-	-
Netilmicin	58	-	-	-	90	-	-

Table 5: Antibiotic sensitivity pattern (Gram negative bacilli)

Antibiotic Resistance Pattern: 26% of pseudomonas was found to be resistant to meropenem, 7.2% to piperacillin-tazobactam (piptaz), 10% to imipenem, 11% to amikacin.

33% of klebsiella was found to be resistant to piptaz, 12.7% to amikacin, 41.2% to cefipime, 7.9% to levofloxacin. 20% of acinetobacter was found to be resistant to amikacin, 68% to imipenem, 33% to piptaz, 68% to ciprofloxacin. 26.3% of proteus spp found to be resistant to amikacin, but 100% sensitive to imipenem, levofloxacin, piptaz, cefepime. 10% of enterobacter species found to be resistant to meropenem, piptaz, levofloxacin, tobramycin but showed 100% sensitivity to amikacin. 11.8% of citrobacter spp found to be resistant to amikacin, piptaz and levofloxacin, 17.7% found to be resistant to imipenem. 12% of E-coli found to be resistant to meropenem, tobramycin, netilmicin, 9.91% to amikacin, 12% to piptaz, but 100% sensitive to levofloxacin.

79.2% of staphylococcus aureus found to be resistant to amoxyclav, 29% to oxacillin, 37% to cefipime, but 100% sensitive to vancomycin. 31.4% of enterococci found to be resistant to amoxyclav, 39.2% to cefipime, 3.9% to linezolid and 100% sensitive to vancomycin, tetracyclin, linezolid and 100% resistant to erythromycin. Streptococcus pyogenes found to be 100% sensitive to all antibiotics. W

Antibiotic	Pseudomonas	klebsiella	Acinetobacter	proteus	Enterobacter	citro-bacter	Ecoli
Amikacin	21.7	12.7	20	26.3	0	11.8	9.1
Amoxyclav	95.6	93.7	80	73.7	90	88.2	78.8
Ampicillin	-	93.7	84	73.7	90	88.2	78.8
Cefoperazone	-	68.3	76	31.6	40	64.7	54.5
Cefipime	36.3	41.2	60	0	40	17.7	39.4
ciprofloxacin	-	62	68	31.6	30	47	51.5
Cefuroxime	76.8	66.7	76	15.8	70	70.6	54.5
Cotrimoxazole	-	73	76	47.4	60	58.5	45.5
Gentamicin	27.5	15.8	52	26.3	30	17.7	9.1
Imipenem	10	15.8	68	0	40	17.7	15
Levofloxacin	10	7.9	7	0	10	11.8	0
Piperacillin + Tazobactam	7.2	33.3	20	0	10	11.8	12
Meropenem	26	-	-	-	10	-	-
Tobramycin	31.8	-	-	-	10	-	-
Netilmicin	42	-	-	-	10	-	-

Table 6: Antibiotic resistance pattern (Gram negative bacilli)

ORIGINAL ARTICLE

Antibiotics	Staphylococcus aureus	CONS	Entero cocci	Strepto coccus pyogene
Amoxyclav	79.2	33.3	31.3	0
Clindamycin	20.8	0	60.8	0
Cefaperazone	16.7	0	35.3	0
Ofloxacin	20.8	33.3	47.1	0
Cefepime	37.5	33.3	39.2	0
Oxacillin	29.2	33.3	39.2	0
Lomefloxacin	12.5	66.7	39.2	0
Erythromycin	33.3	100	43.1	0
Gentamicin	20.8	33.3	39.2	0
Tetracycline	0	0	3.9	0
Llinezolid	4.2	0	3.9	0
Vancomycin	0	0	0	0

Table 7: Antibiotic resistance pattern(Gram positive cocci)

DISCUSSION: Diabetic foot ulcers are one of the most common complications of diabetes. Appropriate antibiotic therapy is essential for decreasing the morbidity and mortality in diabetic foot patient. In the present study, 72.4% were males and 36.67% were females. Total 372 isolates were obtained from 290 patients.

Wound Culture revealed 30% poly-microbial infection and 59.3% patients had mono-microbial infection. Study of citron et al revealed 16.2% mono-microbial infection and 83% poly-microbial infection.³ Zubair et al reported 33% poly-microbial infection and 56 % mono-microbial infection. This findings correlates with Zubair's study.⁴

Most prevalent isolates were gram negative bacilli. About 85.8% patients were infected with gram negative bacilli and 35.86% with gram positive cocci. The most common isolate in both the mixed and single infection was *Pseudomonas* (22.6%). Considering all the infections, *klebsiella* was the second common isolate, however *staph. aureus* was the second common isolate in mono-bacterial infection, followed by *klebsiella*. Zubair et al reported *staph. aureus* as the predominant isolate. But Pappu et al and Priyadarshini et al reported *pseudomonas* as the most common isolate.

Considering all infections, the, most common gram positive cocci was Entero cocci (17.5%) followed by *staph aureus* (16.56%). *Staphylococcus aureus* was the most common gram positive cocci in all other studies.

Psuedomonas found to be 26% resistant to Meropenem, 26% to Cefepime, 76% to cefuroxime, 21% to amikacin and 7.2% to piptaz, but only 10% to quinolone. In priyadarshini's study *Pseudomonas aeruginosa* showed more than 50% resistance to Gentamicin and the Quinolones, 61% resistance to the 3rd generation cephalosporins and 46.1% resistance to the 4th generation cephalosporins. It was sensitive (100%) to Polymyxin B, Colistin, Meropenem and. Our findings doesn't correlate with those of priyadarshini's study.^{5,6}

Klebsiella found to be 93, 7% resistant to Amoxyclav and 68.3% to third generation cephalosporin and 33.3% to piptaz and 12.7% to Amikacin and 41.2% to cefipime, our finding correlates with Girish study.⁷

ORIGINAL ARTICLE

Enterobacter showed 10% multi drug resistance. 12% Of E-coli showed multi drug resistance. Girish's study showed 60% multidrug resistance in Ecoli. Proteus showed 31.6% resistance to cephalosporin, 100% sensitive to imipenem, piptaz, levoflox. Alavi, et al reported that proteus was 100% sensitive to ciprofloxacin.⁸

29.2% of Staphylococcus aureus were resistant to methicillin in our study. Methicillin resistance was found in 21%, 30.2% of S. aureus in Anandi's and Dang, s study respectively.⁹

Staphylococcus aureus showed 79% resistance to Amoxyclav, 29% to oxacillin, 33% to erythromycin, 4.2% linezolid and 100% sensitive to vancomycin and tetracyclin. Benwan KA,¹⁰ et al reported Vancomycin as the most effective treatment for Gram-positive bacteria¹¹

Shankar et al., reported that 100% of the Staphylococcus aureus isolates were sensitive to vancomycin.¹²

Enterococci showed 39.2% resistance to oxacillin and tetracyclin, 43% to erythromycin, 100% sensitive to vancomycin. Gadepalli et al reported high levels of resistance to erythromycin, tetracycline, and ciprofloxacin (40% each) in Enterococcus species. Our study findings correlates with those of Gadepalli's study.¹³

Streptococcus pyogenes showed 100% sensitivity to all antibiotics. This is in accordance with Raja N S'¹⁴ s.study. CONS showed 100% sensitivity to vancomycin, 100% resistance to erythromycin. All cocci found to be sensitive to vancomycin.

Goldstein¹⁵ et al and Citron¹⁶ et al reported as aerobic bacteria (Staphylococcus spp., Streptococcus spp., and Enterobacteriaceae), anaerobic flora, and fungi are the organisms that are isolated most often. While treating unresolving diabetic foot ulcer, antifungals may be considered.

CONCLUSION: Gram negative bacilli was associated with majority of diabetic foot infection. Pseudomonas was the most common organism isolated, followed by klebsiella. Pseudomonas showed high degree of multi drug resistance. Ulcers should be treated with antibiotics according to sensitivity to reduce multidrug resistance.

REFERENCES:

1. El-Tahawy AT. Bacteriology of diabetic foot. Saudi Med J. 2000 Apr; 21(4):344-7.
2. Lipsky, B. A., A. R. Berendt, H. G. Deery, J. M. Embil, W. S. Joseph, A. W. Karchmer, J. L. Le Frock, D. P. Lew, J. T. Mader, C. Norden, and J. S. Tan. 2004. Diagnosis and treatment of diabetic foot infections. Clin. Infect. Dis. 39:885-910.
3. Citron DM, Goldstein EJC, Merriam VC, Lipsky BA. Bacteriology of moderate to severe diabetic foot infections and invitro activity of antimicrobial agents. J Clin Microbiol. 2007; 45 (9): 2819-28.
4. Zubair M, Malik A, Ahmad J. Clinico-bacteriology and risk factors for the diabetic foot infection with multidrug resistant microorganisms in North India. Biol Med. 2010; 2 (4): 22-34.
5. Pappu AK, Sinha A, Johnson A. Microbiological profile of diabetic foot ulcer. Calicut Med Journal. 2011; 9(3): e: 1-4.
6. Dr. Priyadarshini Shanmugam, Jeya M, Linda Susan. Journal of Clinical and Diagnostic Research. 2013 March, Vol-7(3): 441-445.
7. Girish MB, Kumar TN and Srinivas R. Pattern of antimicrobials used to treat infected diabetic foot in a tertiary care hospital in Kolar. Int J Pharm Biomed Res. 2010; 1(2): 48-52.

ORIGINAL ARTICLE

8. Alavi SM, Khosravi AD, Sarami A, Dashtbozorg A, Montazeri EA. Bacteriologic study of diabetic foot ulcer. *Pak J Med Sciences* 2007; 23(5): 681-84.
9. Anandi C, Alaguraja D, Natarajan V. Bacteriology of diabetic foot lesions. *Indian J Med Microbiol.* 2004; 22 (3): 175 – 78.
10. Dang, C. N., Y. D. Prasad, A. J. Boulton, and E. B. Jude. 2003. Methicillin-resistant *Staphylococcus aureus* in the diabetic foot clinic: a worsening problem. *Diabet. Med.* 20:159-161.
11. Benwan KA, Mulla AA, Rotimi VO. A study of the microbiology of diabetic foot infections in a teaching hospital in Kuwait. *J Infect Public health.* 2012; 5(1): 1-8.
12. Shanker EM, Mohan V, Premalatha G, Srinivasan RS, Usha AR. Bacterial etiology of diabetic foot infection in south India. *Eur J Int Med.* 2005; 16: 567-70.
13. Gadepalli R, Dhawan B, Sreenivas V, Kapil A, Ammini AC. A clinicomicrobiological study of diabetic foot ulcers in an Indian tertiary care hospital. *Diabetes Care.* 2006; 29 (8): 1727-32.
14. Raja NS. Microbiology of diabetic foot infections in a teaching hospital in Malaysia: A retrospective study of 194 cases. *J Microbiol immunol infect.* 2007; 40(1): 39-44.
15. Candel Gonzalez FJ, Alramadan M, Matesanz M, Diaz A, Gonzalez-Romo F, Candel I et al. Infections in diabetic foot ulcers. *Eur J Intern Med.* 2003; 14:341-3.
16. Goldstein EJ, Citron DM, Nesbit CA: Diabetic foot infections: bacteriology and activity of 10 oral antimicrobial agents against bacteria isolated from consecutive cases. *Diabetes Care* 1996; 19:638-641.

AUTHORS:

1. Sajila Nalakath Mukkunnath
2. R. Manjunath
3. Mahesh Desai

PARTICULARS OF CONTRIBUTORS:

1. Post Graduate, Department of General Medicine, KIMS Hospital & Research Centre, Bangalore.
2. Professor, Department of General Medicine, KIMS Hospital & Research Centre, Bangalore.

FINANCIAL OR OTHER

COMPETING INTERESTS: None

3. Post Graduate, Department of General Medicine, KIMS Hospital & Research Centre, Bangalore.

NAME ADDRESS EMAIL ID OF THE CORRESPONDING AUTHOR:

Dr. Sajila Nalakath Mukkunnath,
Department of General Medicine,
KIMS Hospital & Research Centre,
Bangalore.
E-mail: sajoosnaachu@yahoo.com

Date of Submission: 02/03/2015.
Date of Peer Review: 03/03/2015.
Date of Acceptance: 08/04/2015.
Date of Publishing: 13/05/2015.