# **Research Article**

DOI: 10.18203/2320-6012.ijrms20150173

# A comparative study on lower extremity amputation (LEA) stump outcome in diabetic and non-diabetic patients in a tertiary care hospital of Raipur City, Chhattisgarh, India

P. M. Luka<sup>1</sup>\*, Narendra Prasad Narsingh<sup>2</sup>, Sumit Agasty<sup>3</sup>

<sup>1</sup>Director Professor and Head of Department, <sup>2</sup>Assistant Professor, <sup>3</sup>Post Graduate Student, Department of Surgery, Pt. J.N.M. Medical College and Dr. B.R.A.M Hospital, Raipur, Chhattisgarh, India

Received: 23 April 2015 Revised: 01 May 2015 Accepted: 08 May 2015

# \*Correspondence:

Dr. P. M. Luka,

E-mail: drpmluka@hotmail.com, dhiraj.bhawnani@gmail.com, sumit6036@gmail.com

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# **ABSTRACT**

**Background:** Amputation is among the oldest operation known to man. It is the surgical removal of a limb or body part and performed to remove diseased tissue or relieve pain. Amputation is associated with some complications. Infection and failure of stump to heal are major complications. The Diabetes related Lower Extremity Amputation (LEA) is likely to be associated with a worse outcome as compared to the non-diabetic amputations because of the presence of several risk factors which hamper the wound healing process. Amputees with diabetes are more likely to undergo amputation at a younger age and need higher-level amputations when compared with patients without diabetes. With this background, the present study was planned to understand the factors that place diabetic patients at increased risk of amputation in the study area so that further morbidity can be prevented.

**Methods**: The current prospective study was conducted in the Department of Surgery, Dr. B.R.A.M. Hospital, Pt. JNM Medical College, Raipur (C.G.) India, among 60 patients admitted in the General Surgery wards during January 2013 to August 2014. Study subjects were categorized into those related to diabetes mellitus and those due to other causes. All Investigations relevant to the study (Random blood sugar, Serum albumin, Complete blood count, renal function test and Doppler) were done in all the patients. Postoperatively the cases were examined for various complications of amputation stump in post operative period were noted.

**Results:** Mean age for diabetic cases was 50 years and that for non-diabetic cases was 47 years. In this study, among the diabetic amputations, 84 % were males and 16 % were females. Total 60 amputations were performed in the study. Stump infection (50 % in diabetics and 29 % in non-diabetics) was the most common stump complication. Followed by wound dehiscence (25 % in diabetics and 11 % in non-diabetics)

**Conclusion:** Diabetic amputations are at a higher risk of complications. They need to be carefully screened and selected for appropriate level of amputation and watched meticulously for occurrence of complications.

Keywords: Lower extremity amputation, Diabetic, Stump complication, Chhattisgarh

### INTRODUCTION

Amputation is the surgical removal of a limb or body part and performed to remove diseased tissue or relieve pain. Among the diseases and conditions that may lead to amputations of an extremity, the most prevalent are hardening of the arteries, arterial embolism, diabetes mellitus, gangrene, severe frostbite. Most leg amputations are performed for peripheral vascular disease (macroangiopathy) including diabetics and non-diabetics.<sup>1</sup>

Stump is the terminal segment, remaining after amputations and it is also the part which is enclosed within the socket of the prosthesis.

Amputation has some complications. Infection is most often a major problem to amputees. Failure of stump to heal is other major complication. Non- healing is due to inadequate blood supply. Patients who have undergone a major lower limb amputation are also at a higher risk of a subsequent ipsilateral or contralateral amputation.

Amputees with diabetes are more likely to undergo amputation at a younger age and need higher-level amputations when compared with patients without diabetes. Stump care therefore has an important role in outcome of patient. Before fitting the prosthesis, stump should be in proper condition. The Main purpose of stump care is to prevent the further complications.

The diabetes related LEA is likely to be associated with a worse outcome as compared to the non-diabetic amputations because of the presence of several risk factors which hamper the wound healing process.

Comparing outcome among diabetes related and non diabetic amputations are important for various strategic purposes. With this background, the present study was planned to understand the factors that place diabetic patients at increased risk of amputation in the study area

# **METHODS**

The current prospective study was conducted in the Department of Surgery, Dr. B.R.A.M. Hospital, Pt. JNM Medical College, Raipur (C.G.) India, among 60 patients admitted in the General Surgery wards during January 2013 to August 2014. Study subjects were categorized into those related to diabetes mellitus and those due to other causes. Group A comprised of the patients who were known cases of diabetes having limb threatening foot lesion and undergoing lower extremity amputations. Group B comprised of the patients who were undergoing amputations for other causes: Arterial disease and infections of the lower extremity and had no known history or present evidence of diabetes mellitus. Ethical considerations were met through intuitional ethical committee. Each patient was informed and written consent was taken to participate in the study.

#### Inclusion Criteria

- 1. Adult patients of both genders undergoing lower limb amputation (LEA) with known DM or present evidence of DM were included in group A.
- Adult patients of both genders undergoing LEA without known DM or any present evidence of DM were included in group B.

3. Adult patients of both genders undergoing LEA who have already had a previous amputation of same or collateral limb in group A and group B according to their diabetic status.

#### **Exclusion Criteria**

- 1. Patients undergoing upper limb amputations were excluded from both the groups.
- 2. Patients of paediatric age group (below 14 years) were excluded from both groups.

Detailed clinical history and examination of the patient was recorded i.e. Preliminary history: Age, Sex, Level of education, Social status, history of diabetes mellitus, Foot lesion, History of infection- discharge of pus from the lesion, blackening with foul smelling discharge. General, systemic, local and vascular examination was done. All Investigations relevant to the study (Random blood sugar, Serum albumin, Complete blood count, renal function test and Doppler) were done in all the patients. Postoperatively the cases were examined for: Various complications of amputation stump in post operative period were noted and the total duration of hospital stay was assessed. Need for Stump revision and re-amputation was compared between the two groups. These amputation stump outcome parameters were compared among the study groups diabetics and non diabetics.

Data was compiled in MS Excel and checked for its completeness and correctness. Then it was analyzed using online statistical calculator and chi square test were applied with value of <0.05 was considered statistically significant for interpretation of finding.

## **RESULTS**

Table 1: Age and sex wise distribution of the study subjects.

Age in years	Total	Diabetic cases	Non-diabetic cases
<40	12(20 %)	5(16 %)	7(25 %)
40-59	33(55 %)	17(53 %)	16(57 %)
>60	15 (25 %)	10(31 %)	5(18 %)
Mean Age (Years)	49	50	47
Male	52(86.6 %)	27(84 %)	25(89 %)
Female	8(13.4 %)	5(16 % )	3(11 %)

The most common age group was 40 -59 years. Mean age for diabetic cases was 50 years and that for non-diabetic cases was 47 years. In this study, among the diabetic amputations, 84 % were males and 16 % were females. Among the non-diabetic amputations, 89 % were males and 11 % females.

**Table 2: Clinical presentation of cases.** 

Clinical Presentation	Number of Cases	Percentage
Lower Limb Pain	35	58
Ulcer	42	70
Lower Limb Infection	28	47
Gangrene	47	78

Lower limb pain was seen in 58 % cases at presentation, ulcer in 70 % cases, lower limb infection in 47 % and gangrene were present in 78 % cases at the time of presentation.

Table 3: Various levels of amputations in study subjects.

Level of Amputation	Number of Cases	Percentage
Above Knee Amputations	15	25
Below Knee Amputation	32	53
Foot Amputation	13	22

Total 60 amputations were performed in the study. Diabetes related amputations accounted for 53 % and non diabetes related amputations for 47 % cases. Above knee amputations accounted for 25 % cases, below knee amputations for 53 % and foot amputations accounted for 22 % cases.

Table 4: Various post-operative stump complications in amputation cases.

Post-Operative Complications	Number of Cases	Percentage
Pain	5	8
Oedema	6	10
Wound Dehiscence	11	18
Infection	24	40

Post-operative stump pain was noted in 8 % cases, stump oedema in 10 % cases, wound dehiscence was noted in 18 % cases and amputation stump infection occurred in 40 % cases.

Table 5: Comparative distribution of stump complications in diabetic and non-diabetic amputations.

Cases	Total	Pain	Oedema	Wound Dehiscence	Infection
Diabetic	32	3(9 %)	2(6 %)	8(25 %)	16(50 %)
Non- Diabetic	28	2(7 %)	4(14 %)	3(11 %)	8(29 %)
Constant L	ower Li	mb Pain			
Total	35	3(8.5 %)	3(8.5 %)	5(14 %)	14(40 %)
Diabetic	11	1(9 %)	0	3(27 %)	7(64 %)
Non- Diabetic	24	2(8 %)	3(12.5%)	2(8 %)	7(29%)
Ulcer					
Total	42	2(5 %)	3(7 %)	9(21 %)	16(38 %)
Diabetic	28	2(7 %)	1(3.5 %)	7(25 %)	14(50 %)
Non- Diabetic	14	0	2(14 %)	2(14 %)	2(14 %)
Lower Lin	ıb Infect	ion			
Total	28	1(3.5 %)	4(14 %)	7(25 %)	15(53 .5%)
Diabetic	18	1(6%)	2(12 %)	6(33 %)	11(61 %)
Non- Diabetic	10	0	2(20 %)	1(10 %)	4(40 %)
Gangrene					
Total	47	4(8.5 %)	6(13 %)	9(19 %)	19(40 %)
Diabetic	23	2(9 %)	2(9 %)	6(23 %)	11(48 %)
Non- Diabetic	24	2(8 %)	4(16 %)	3(12.5%)	8(32 %)

In the diabetic cases post operative stump pain featured as complication in 9% (3), stump oedema was seen in 6 % wound dehiscence was seen in 25 % Infection was seen in 16 (50 %) diabetic amputations. Among the nondiabetic cases stump pain was noted in 7 % and stump oedema in 14 % cases. Lower limb pain was present in 35 cases, among them occurrence of post operative stump complications were studied- stump pain and oedema in 8.5 % (3) each, wound dehiscence in 14 % (5) and stump infection in 40 % (14). Lower limb ulcer was present 42 cases, among these cases the occurrence of post operative complications was studied- stump pain in 5 % (2), oedema in 7 % (3), wound dehiscence in 21 % (9) and stump infection in 38 % (16). Lower limb Infection was present in 28 cases, the occurrence of post operative complications was studied- stump pain in 3.5 % (1), stump oedema in 14 % (4), wound dehiscence in 25 % (7) and stump infection observed in 53.5 % (15). Lower limb Gangrene was present in 47 cases, the occurrence of post operative complications was studied- stump pain in 8.5 % (4), stump oedema in 13 % (6), wound dehiscence in 19 % (9) and stump infection in 40 % (19).

Table 6: Comparison of Diabetics and non Diabetics cases according to popliteal pulse.

Popliteal Pulse	Cases	Total	Pain	Oedema	Wound Dehiscence	Infection
Duagant	Diabetics	26	1(4 %)	1(4 %)	8(31 %)	13(50 %)
Present	Non-Diabetics	21	1(5 %)	3(14 %)	2(9.5 %)	6(28 %)
Abcont	Diabetics	6	2(33 %)	1(17 %)	0	3(50 %)
Absent	Non-Diabetics	7	1(14 %)	1(14 %)	1(14 %)	2(28 %)

Table 7: Occurrence of various post operative amputation stump complications in relation to various variables.

Variable	Total	Pain	Oedema	Wound dehiscence	Infection		
Serum Albumin (g/d	11)						
<3.5	41	5(12%)	5(12 %)	10(24%)	22(54%)		
>3.5	19	0	1(5%)	1(5 %)	2(10.5%)		
Haemoglobin (g/dl)							
<11	25	3(12%)	1(4%)	4(16%)	11(44%)		
>11	35	2(6%)	5(14%)	7(20 %)	13(37%)		
Random blood sugar	r (mg/dl)						
<200	18	2(11%)	1(5.5%)	4(22%)	7(39%)		
>200	14	1(7%)	1(7%)	4(28.5%)	9(64%)		
Abnormal Colour Doppler Flow in lower Limb							
Total	43	5(12%)	5(12%)	7(16%)	17(395%)		
Diabetic	18	3(17%)	1(5.5%)	4(22%)	9(50%)		
Non-diabetic	25	2(8%)	4(16%)	3(12%)	8(32%)		

Table 8: Variables related to stump in study subjects.

Cases		Total	Pain	Oedema	Wound ddehiscence	Infection
Stump						
Diabetic	Open	16	1(6 %)	1(6 %)	7(44 %)	11(69 %)
Diabetic	Closed	16	2(12 %)	1(6 %)	1(6 %)	5(31 %)
Non diabatia	Open	6	1(17 %)	2(33 %)	1(17 %)	4(67 %)
Non diabetic	Closed	22	1(4.5 %)	2(9%)	2(9 %)	4(18 %)
Stump Primarily Closed						
Diabetic	Drain	9	0	1(11 %)	1(11 %)	4(44 %)
	No Drain	7	2(28.5 %)	0	0	1(14 %)
Non diabetic	Drain	6	0	1(17 %)	1(17 %)	2(33 %)
	No Drain	16	1(6 %)	1(6 %)	1(6 %)	2(12.5 %)

Among the diabetic cases, of the 6 cases that presented with absent popliteal pulse, stump pain in 33.3 % (2) stump oedema in 17 % (1) and stump infection in 50 % (3). Among the non-diabetic cases, of the 7 cases that presented with absent popliteal pulse, stump pain, stump oedema and wound dehiscence was noted in 14 % (1) and stump infection in 28 % (2).

Serum albumin less than 3.5 g/dl was found in 41 cases. The occurrence of post operative complications was studied- stump pain and oedema in 12 % (5), wound dehiscence in 24 % (10) and stump infection observed in 54 % (22). In 25 cases that presented with haemoglobin less than 11 g/dl, the occurrence of post operative complications was studied- stump pain in 12 % (3), stump oedema 4 % (1), wound dehiscence in 16 % (4) and stump infection was noted in 44 % (11).

14 diabetics presented with Random Blood Sugar more than 200 mg/dl, stump pain and oedema was noted in 7 % (1), wound dehiscence in 28.5 % (4) and stump infection was noted in 64 % (9). The 18 cases that presented with

random blood sugar less than 200 mg/dl, the occurrence of post operative complications was studied- stump pain in 11 % (2), stump oedema 5.5 % (1), wound dehiscence in 22 % (4) and stump infection noted in 39 % (7).

Abnormal Lower limb colour doppler was noted in 43 cases, stump pain and oedema in 12 % (5), wound dehiscence in 16 % (7) and stump infections noted in 39.5 % (17).

Among the diabetic cases, of the 16 amputations in which stump was kept open, the occurrence of post operative complications was studied-stump pain and stump oedema in 6 % each, wound dehiscence in 44 % and stump infection noted in 69 % In 16 diabetic amputations the stump was closed primarily, among them stump pain was noted in 12 % oedema and wound dehiscence each in 6 %, stump infections noted in 31 %

Among the diabetic cases, of the 9 amputations in which drain was placed in primarily closed stump, the occurrence of post operative complications was studied-

stump oedema and wound dehiscence was noted in 11 % each and stump infection in 44 %. In 7 diabetic amputations no drain was placed and the stump was closed primarily, stump pain was noted in 28.5 % and stump infection in 14 %.

# **DISCUSSION**

In this study, 60 amputations were performed. Diabetes related amputations accounted for 53 % and non-Diabetes related amputations for 47 % cases. In a study Nehler MR, et al<sup>2</sup> observed 154 patients who underwent 172 major amputations, because of peripheral arterial disease (87%) and diabetic foot (13 %). A Nigerian study by Kidmas et al<sup>3</sup> diabetic foot sepsis accounted for 26.4 % of the lower limb amputations. In a series Sié Essoh JB et al<sup>4</sup> observed that trauma (49.9%), followed by diabetic foot sepsis (31.4%) and peripheral vascular disease (13%) were the main indications for Lower extremity amputation. Phillipo L Chalya et al<sup>5</sup> in their study on a total of 162 patients found that the most common indication for major limb amputation was diabetic foot complications in 41.9% and peripheral vascular disease in 8.6% respectively. In their study, Lazzarini PA et al<sup>6</sup> concluded that key conditions associated with amputation included diabetes (53%), peripheral arterial disease (18%). In a retrospective study of major limb amputations performed by A Ajibade et al<sup>7</sup> the commonest indication was trauma (42.4%) followed by critical limb ischemia (gangrene) (31.8%). Diabetic foot gangrene accounted for only 4.5% of the amputations.

In the present study, among the diabetic amputations, 84 % were males and 16% were females. Among the nondiabetic amputations, 89% were males and 11% females. In a study of diabetic and non-diabetic amputations Ogeng'o et al<sup>8</sup> found that among the diabetics' males were 70 % and females were 30 % (18) and among the non-diabetic cases males were 80.5 % and females were 19.5 %. Mohamed Osman Suliman et al<sup>9</sup> Seventy patients with diabetes who underwent major lower limb amputations were studied. The male to female ratio was 1.5:1.0. In the study of patients undergoing below-knee amputations between 2005-2008 selected from the database of the National Surgical Quality Improvement Program (NSQIP), Belmont PJ Jr et al 10 found that 64.3% were males and 35.7 % were females. In the study of Lazzarini PA et al<sup>6</sup> Males accounted for 69% amputees which was significantly higher than females (31%).

In the current study, in the age group under 40 years 20 % cases were observed, between 40 and 59 years 55 % cases and above 60 years age group 25 % cases were present. The average age was 49 years. Mean age for diabetic cases was 50 years and that for non-diabetic cases was 47 years. In the study of Mohamed Osman Suliman et al<sup>9</sup> seventy patients with diabetes who underwent major lower limb amputations were studied. The age ranged between 35 and 95 years and the mean age of 61.5 years. In the study of patients undergoing

below-knee amputations between 2005-2008 selected from the database of the National Surgical Quality Improvement Program (NSQIP), Belmont PJ Jr et al<sup>10</sup> found that the average age of patients was 65.8 years.

In this study, lower limb pain was seen in 58 % cases at presentation, ulcer in 70 % cases, lower limb infection in 47 % and gangrene was present in 78 % cases at the time of presentation. Aragón-Sánchez J et al<sup>11</sup> did a retrospective analysis of 283 major lower extremity amputations and found that 38.4 % diabetics and 11.3 % non-diabetics presented with lower limb infections. Mohamed Osman Suliman et al<sup>9</sup> Seventy patients who underwent major lower limb amputations were studied. At presentation intractable infection of lower limb was present in 80%, gangrene was present in 44% and ulcer in 18.5%.

In our study above knee amputations accounted for 25 % cases, below knee amputations for 53 % and foot amputations accounted for 22 % cases. In the study by Mohamed Osman Suliman et al <sup>9</sup> seventy patients with diabetes who underwent major lower limb amputations were analyzed, 74% had BKA and 26% had AKA. Phillipo L Chalya et al<sup>5</sup> in their study on a total of 162 patients found that below knee amputation was the most common procedure performed in 46.3%.

In the present study, post-operative stump pain was noted in 8 % cases, stump oedema in 10 % cases, wound dehiscence was noted in 18 % cases and amputation stump infection occurred in 40 % cases. In their study Coello R et al<sup>12</sup> found that lower limb amputation had the highest incidence of surgical site infection (14.3 %). In the study of 231 amputations conducted by José Maria Pereira de Godoy et al<sup>13</sup> 7.3% suffered infections of the amputation stump. Belmont PJ Jr et al<sup>10</sup> found that the overall stump complication rate was 34.4%. The most common post operative stump complication was wound infection (9.3%). In their study on a total of 162 amputations for diabetic foot and peripheral vascular disease Phillipo L Chalya et al<sup>5</sup> found that surgical site infection was the most common complication accounting for 21.0%. Stump pain was noted in 5.3 %, wound dehiscence in 3.1 % and hematoma in 4.3 % cases. In a study of major limb amputations by A Ajibade et al<sup>7</sup> wound infection occurred in 41.5 % amputees, Stump pain and wound dehiscence was reported in 9.8 % cases each.

In the current study, among the diabetic cases post operative stump pain featured as complication in 9% stump oedema was seen in 6 % wound dehiscence was seen in 25 % Infection was seen in 16 (50 %) diabetic amputations. Among the non-diabetic cases stump pain was noted in 7 % (2), stump oedema in 14 % (4) cases, wound dehiscence in 11 % (3) and stump infection in 29 % (8) non-diabetic amputations. Aragón-Sánchez J et al<sup>11</sup> did a retrospective analysis of 283 major lower extremity amputations Stump infection occurred in 1.6 % non-

diabetics and 6.4 % diabetics. Stump necrosis or dehiscence occurred in 11.3 % non-diabetics and 9.5 % diabetics. They concluded that the differences in the outcome of major amputations between diabetic and nondiabetic patients in relation to wound healing, stump infection and stump necrosis were not statistically significant. Mohamed Osman Suliman et al<sup>9</sup> Seventy patients with diabetes who underwent major lower limb amputations were studied. Postoperative complications were noted, wound infection in 16% and wound dehiscence in 8.5%. Julius A. Ogeng'o BSC et al<sup>8</sup> in their comparative study of diabetic and non-diabetic amputations found that stump infections were more common among diabetes related amputations (58.3 %) than the non-diabetic cases (26 %) cases. Alexandra Alvarsson et al<sup>14</sup> found that Diabetic patients with foot infections at presentation suffered more stump related complications compared to non-diabetic patients.

In this study, lower limb pain was present in 35 cases at presentation, occurrence of post operative stump complications was studied-stump pain and oedema in 8.5 % (3) each, wound dehiscence in 14 % and stump infection in 40 %. Cruz CP et al<sup>15</sup> retrospectively analyzed 296 consecutive major lower extremity amputations for critical limb ischemia. Of these, 42% complained of pain in the limb. Over all 30% amputations developed wound complications.

In the current study, lower limb Ulcer was presenting feature in 42 cases. Complications-stump pain in 5 % (2), oedema in 7 % (3), wound dehiscence in 21 % (9) and stump infection in 38 % (16). Mohamed Osman Suliman et al<sup>9</sup> Seventy patients with diabetes who underwent major lower limb amputations were studied. At presentation ulcer was present in 18.5%. The most frequently encountered postoperative complications were wound infection in 16% followed by wound dehiscence in 8.5%.

In the present study, lower limb Infection was present in 28 cases. Among the diabetic cases, of the 18 cases who presented with lower limb Infection, stump pain in 6 % (1), stump oedema in 12 % (2), wound dehiscence in 33 % (6) and stump infection observed in 61 % (11). Among the non-diabetic cases, of the 10 cases who presented with lower limb Infection, stump oedema was noted in 20 % (2), wound dehiscence in 10 % (1) and stump infection observed in 40 % (4). Alexandra Alvarsson et al<sup>14</sup> found that among the co-morbidities associated with an increased risk of lower extremity amputation failure: foot infection was one factor. Diabetic patients with foot infections at presentation suffered more stump related complications compared to non-diabetic patients. A retrospective study of major limb amputations performed from January 2006 to December 2010 was carried out by A Ajibade et al,<sup>7</sup> there were total 132 amputations. Of the cases that had Lower limb infection at the time of presentation 33 % had stump infection and wound dehiscence each.

In this study, lower limb gangrene was present in 47 cases. A retrospective study of major limb amputations performed from January 2006 to December 2010 was carried out by A Ajibade et al.<sup>7</sup> There were total 132 amputations, of the cases that presented with gangrene, 8% had stump infection and 2% had wound dehiscence.

In the present study, among the diabetic cases, of the 26 cases that presented palpable popliteal pulse, stump pain and stump oedema in 4 % (1), wound dehiscence in 31 % (8) and stump infection in 50 % (13). Among the non-diabetic cases, of the 21 cases that presented with palpable popliteal pulse, stump pain noted in 5 % (1), stump oedema in 14 % (3), wound dehiscence in 9.5 % (2) and stump infection in 28 % (6). Aragón-Sánchez J et al<sup>11</sup> did a retrospective analysis of 283 major lower extremity amputations and observed that 3.2 % non-diabetics and 3.4 % diabetics had palpable popliteal pulse. Stump infection occurred in 1.6 % non-diabetics and 6.4 % diabetics. Stump necrosis or dehiscence occurred in 11.3 % non-diabetics and 9.5 % diabetics.

Serum albumin less than 3.5 g/dl in 41 cases, the occurrence of post operative complications was studiedstump pain and oedema in 12 %, wound dehiscence in 24 % (10) and stump infection in 54 %. Malnourished patients had a higher frequency of impaired wound undergoing healing, 2911 patients below-knee amputations were evaluated by Belmont PJ Jr et al, 10 they observed that serum albumin levels <3.5 g/dl increased the risk of stump complications and had high sensitivity for predicting the re-operation rate. The most common major complication was wound infection 9.3% and wound dehiscence in 2.4%.

In the present study, in 25 cases that presented with haemoglobin less than 11 g/dl, stump pain was noted in 12 %, stump oedema 4 %, wound dehiscence in 16 % and stump infection in 44%. 35 cases presented with haemoglobin more than 11 g/dl, stump pain was noted in 6 %, stump oedema in 14 %, wound dehiscence in 20 % and stump infection in 37 %. In the 412 non traumatic major lower extremity amputations that were studied by Stone PA et al, <sup>16</sup> they found a higher rate of wound complication was noted in cases of BKA and preoperative hematocrit >30%.

14 diabetics presented with random blood sugar more than 200 mg/dl, stump pain and oedema was noted in 7 % (1), wound dehiscence in 28.5 % (4) and stump infection was noted in 64 % (9). Mohamed Osman Suliman et al<sup>9</sup> seventy patients with diabetes who underwent major lower limb amputations were studied. The majority of patients (75%) had poor glycemic control. The most frequently encountered postoperative complications were wound infection in 16% followed by wound dehiscence in 8.5%.

Abnormal Lower limb colour doppler was noted in 43 cases. From their study of factors affecting the healing of

amputation stump Davis BL et al<sup>17</sup> found that healing in most cases correlated with patency of distal blood flow. They concluded that there were no universally accepted methods for objectively determining successful wound healing.

In the current study, among the diabetic cases, of the 16 amputations in which stump was kept open and later closed, the occurrence of post operative complications was studied. Mohamed Osman Suliman et al<sup>9</sup> Seventy patients with diabetes who underwent major lower limb amputations were studied. The wound was closed primarily in 87% and was left open in 13%. The rate of primary healing without stump complication was 77 % (33 % complication rate) in trans-tibial and 28 % (68 % complication rate) trans-femoral. The most frequently encountered postoperative complications were wound infection in 16% followed by wound dehiscence in 8.5%. 113 below knee amputations upon 100 patients of buerger's disease and thrombosis were studied by Kacy SS et al<sup>18</sup> they concluded that wound complications were minimized when amputations were closed primarily with subcuticular suture and skin tapes

Among the diabetic cases, of the 9 amputations in which drain was placed in primarily closed stump, the occurrence of post operative complications was studied-stump oedema and wound dehiscence was noted in 11 % each and stump infection in 44 %. In their study of 113 below knee amputations upon 100 patients of buerger's disease and arterial thrombosis Kacy SS et al. found that use of wound drains correlated with a 55 per cent wound complication rate versus 16.1 per cent when drains were not used. David Tripses, et al. Healing of below-knee amputation was evaluated in 64 amputees with atherosclerosis, they found that stump drainage increased the likelihood of infection from 20 to 46 percent.

## **CONCLUSION**

Diabetic amputations are at a higher risk of complications, revision procedures and re-amputations as compared to non diabetic amputations. They need to be carefully screened and selected for appropriate level of amputation and watched meticulously for occurrence of complications so that appropriate intervention may be done at early stage and further morbidity prevented.

#### **ACKNOWLEDGEMENTS**

The authors are thankful to Dr. Dhiraj Bhawnani, Assistant Professor, Department of Community Medicine, Government Medical College, Rajnandgaon (C.G.) India, for their valuable guidance and technical support. Authors acknowledge the immense help received from the scholars whose articles are cited and included in references of this manuscript. The authors are also grateful to authors/editors/publishers of all those articles, journals and books from where the literature for this article has been reviewed and discussed.

Funding: No funding sources Conflict of interest: None declared

Ethical approval: The study was approved by the

Institutional Ethics Committee

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DOI: 10.18203/2320-6012.ijrms20150173 **Cite this article as:** Luka PM, Narsingh NP, Agasty S. A comparative study on lower extremity amputation (LEA) stump outcome in diabetic and non-diabetic patients in a tertiary care hospital of Raipur City, Chhattisgarh, India. Int J Res Med Sci 2015;3:1488-95.