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Research Article

TO STUDY THE CUTANEOUS MANIFESTATIONS IN PATIENT USING LOWER LIMB PROSTHESIS

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A B S T R A C T

Background: Skin problems of the stump in lower limb amputees are observed frequently in clinical practice. Aim of current study was to assess the Cutaneous problems and their frequency in patients using lower limb prosthesis. **Methods:** A 2 year Hospital based cross sectional (observational) study in Department of Dermatology, Venereology & Leprosy and Department of Physical Medicine & Rehabilitation, SMS Medical College and Attached Hospitals, Jaipur. **Results:** 100 patients were included in this study. Trauma was the most common cause for major amputation. 63% of the patients who underwent major amputation had cutaneous manifestations. Eczematous Dermatitis was the most common cutaneous manifestation in our study. Second most common manifestation was Callosity and third was Dermatophyte Infection **Conclusions:** Dermatologic conditions are a frequent complication for the lower-extremity amputee who uses a prosthesis.

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INTRODUCTION

In medicine, a prosthesis (plural: prostheses; from Ancient Greek *prosthesis*, addition, application, attachment)[1] is an artificial device that replaces a missing body part, which may be lost through trauma, disease, or congenital conditions. Prosthetics are intended to restore the normal functions of the missing body part.[2]

Lower extremity prosthetics describes artificially replaced limbs located at the hip level or lower. In the prosthetics industry a trans-tibial prosthetic leg is often referred to as a "BK" or below the knee prosthesis and a trans-femoral prosthesis is above the knee prosthesis.

Skin problems of the stump in lower limb amputees are observed frequently in clinical practice.

Factors that make the stump vulnerable to skin problems include:

- Underlying conditions that gave rise to the amputation, e.g., occlusion of small blood vessels in vascular disease such as diabetes or thrombo-embolic disease;
- Variable swelling due to operation, bandaging, venous congestion;
- Scarring at the site of the surgical operation;
- Poorly fitting prosthesis;
- Lack of physiological adaptation to pressures applied by the limb prosthesis;
- Trapping of perspiration in the closely-fitted socket of the prosthesis;
- Proliferation of commensal (normal) and pathogenic bacteria;
- Close contact of materials of the limb prosthesis, which may irritate the skin or rarely, cause an allergic reaction.[3]

Skin problems of the stump in patients using lower limb prosthesis are:

Ulcerations- The occurrence of ulcers on an amputation stump can be an indication of poor prosthesis fit.[4]

Infection- such as bacteria, yeasts and mycoses.[5,6,7]

Allergic contact dermatitis- Component of the prosthesis socket responsible for allergies such as resins, glue, rubber components and leather preservatives.[8]

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Epidermal hyperplasia- verrucous hyperplasia, epidermoid cysts, hyperkeratotic papules. All these conditions have the proliferation of epidermal cells in common.[9,10,11,12]

Malignancies- Development of chronic inflammation into malignancy (Marjolin's ulcer) may be increased when the prosthesis is not fitting well.[13,14,15,16]

Hyperhidrosis- (an unbalance between production and evacuation of sweat) will occur.[17,18]

MATERIALS AND METHODS

The study was be conducted in the Department of Dermatology, Venereology and Leprosy and Department of Physical Medicine & Rehabilitation, SMS Medical College and Attached Hospitals, Jaipur.

It was Hospital based cross sectional (observational) study.

Sample size is calculated at 95% confidence level assuming 36% prevalence of skin problem in Lower Limb amputees as per reference study. At the absolute allowable error of 10%, 88 patients are required for the study which is further rounded off to 100 patients as found sample size for this study.

Eligibility Criteria

Inclusion criteria

- All the patients who wear lower limb prosthesis for 6 months to 30 years for more than two hours per day.
- Used lower limb prosthesis for functional activities.
- Patients who are willing to give consent for inclusion in the study.

Exclusion criteria

- Patient who is not willing to give written informed consent to participate.

Assessment

Patients with lower limb amputation using prosthesis (as diagnosed by attending physician) were selected and their informed consent was taken.

- Their demographic profile, clinical history was taken.
- Took history of amputation, duration and type of wearing of prosthesis.
- Dermatological examination of stump was noted in a predesigned proforma.
- Pictures were taken for documenting the morphological details.
- Various cutaneous problems were noted.
- Assessment of cutaneous problems & their frequency.

OBSERVATION AND RESULTS

100 patients, who were recruited in the study, were noted.
The Observations are presented as status and frequency of Cutaneous problems in the patients using lower limb prosthesis.

Table 1 Status of Cutaneous manifestation

Total	Cutaneous manifestation (No. of patients)	
	Present	Absent
100	63	37

Table 1 shows the Status of Cutaneous manifestation of 100 patients who were using lower limb prosthesis. It was observed that there were 63 patients had cutaneous manifestation.

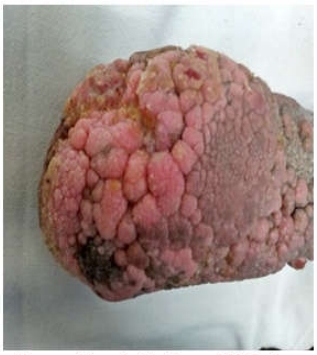
Table 2 Cutaneous manifestations in patient using lower limb prosthesis

Type of Cutaneous Manifestation	No. of Patients	% of Patients From Total Cutaneous Manifestation Patients
Eczematous Dermatitis	20	31.75%
Callosity	11	17.46%
Dermatophyte Infection	9	14.28%
Erosion	4	6.35%
Ulcer	3	4.76%
Post-inflammatory Hyper-pigmentation	3	4.76%
Verrucous Hyperplasia	3	4.76%
Xerosis	3	4.76%
Pyoderma	2	3.17%
Actinomycotic Mycetoma	1	1.59%
Reactive Perforating Collagenosis	1	1.59%
Verrucous Hyperplasia with Ulcer	1	1.59%
Erosion with Dermatophyte Infection	1	1.59%
Eczematous Dermatitis with Callosity	1	1.59%
TOTAL	**63**	**100%**

Table 2 shows Cutaneous manifestations in patient using lower limb prosthesis. Eczematous Dermatitis was the most common manifestation in our study. Second most common manifestation was Callosity and third was Dermatophyte Infection.

Pictures of Cutaneous Manifestation

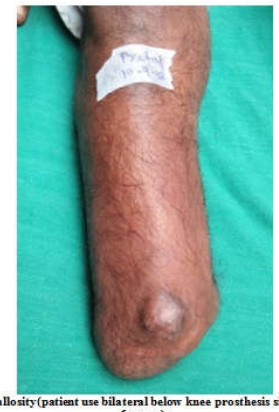
Eczematous Dermatitis(patient use right below knee prosthesis since 7 years)



Verrucous Hyperplasia(patient use left below knee prosthesis since 15 years)

Verrucous Hyperplasia with Ulcer(patient use right below knee prosthesis since 25 years)

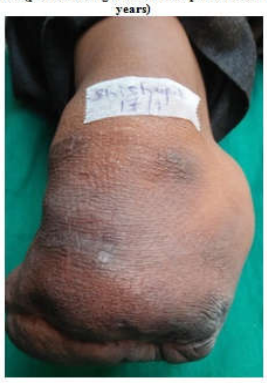
Actinomycotic Mycetoma(patient use right below knee prosthesis since 22 years)



Callosity(patient use bilateral below knee prosthesis since 6 years)

Erosion(patient use right below knee prosthesis since 2 years)

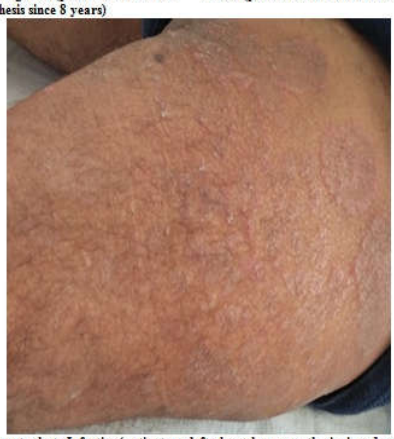
Ulcer(patient use left below knee prosthesis since 1 years)



Post-inflammatory Hyperpigmentation(patient use right below knee prosthesis since 15 years)

Reactive Perforating Collagenosis(patient use left below knee prosthesis since 8 years)

Xerosis(patient use left below knee prosthesis since 4 years)



Dermatophyte Infection(patient use left above knee prosthesis since 1years)

DISCUSSION

Skin problems of the stump in patients using lower limb prosthesis are:

- Erosion, Ulceration
- Infections- Bacterial, Fungal
- Eczematous dermatitis
- Verrucous hyperplasia, Callosity
- Post inflammatory hyper-pigmentation
- Xerosis

The Observations were presented as Status and Frequency of Cutaneous manifestations in the patients using lower limb prosthesis.

We studied of 100 patients who were using lower limb prosthesis. It was observed that there were 63 patients (63%) with cutaneous manifestations attributed to prosthetic use. This high percentage indicates that dermatological problems are important in amputees. The stump in lower limb amputees is prone to skin problems because it is exposed to several unnatural conditions (shear and stress forces and increased humidity) when a prosthesis is used. Early recognition and treatment of these problems can prevent the amputee's mental, social, and economic losses.

Same high percentage of cutaneous manifestations was found in study of Koc E *et al*.[19] (73.9%), study of F. Almassi *et al*.[20] (56.4%) and study of Colgecen E *et al*.[21] (70%). Contrary to our study, prevalence of skin problems was 36% in study of Henk E. J. Meulenbelt *et al*.[22]

In our study most common age group was 41-50 year old which using prosthesis and had cutaneous manifestation. It could be due to more outside working activity in this age group. Mean age of our study was 40.37 year. Male patients (94%) were more common than Female (6%) and Rural patients (60%) were more common than Urban (40%). Most patients were Houseworker, Labourer and Farmer in our study. In our study Trauma was most common cause of amputation, in which Road Traffic Accident was the most common cause. Second most common cause was diabetes and peripheral vascular disease related complications (cellulitis and gangrene).

In our study most common site of amputation was below knee (80%) and below knee prosthesis (80%) was most commonly used. In study of Essoh JB *et al*.[23] reported that below knee amputation was the most common procedure performed.

Patients who using prosthesis from >10 year had greater frequency of Cutaneous manifestation in our study.

In our study Eczematous Dermatitis (31.75%) was the most common cutaneous manifestation, second most common manifestation was Callosity (17.46%) and third was Dermatophyte Infection (14.28%). The stump in lower limb amputees is prone to skin problems because it is exposed to several unnatural conditions (shear and stress forces and increased humidity) when a prosthesis is used. While in study of P N Arora *et al*.[24] showed, hyper-pigmentation in 46 patients (26.4%) followed by callosities in 32 patients (18.3%), scaling in 29 patients (16.7%), cutaneous atrophy in 20 (11.5%) and in study of Lyon CC *et al*.[25] allergic contact dermatitis was seen in 1/3 of patients with stump dermatitis and observed that Allergic contact dermatitis was a significant

problem. In study of Meulenbelt HE *et al*.[8] the main disorders were acroangiodermatitis, allergic contact dermatitis, bullous diseases, epidermal hyperplasia, hyperhidrosis, infections, malignancies and ulcerations. In study of F. Almassi *et al*.[20] the most common skin problems were contact dermatitis 39.5%, calluses 26.6%, folliculitis 14.42% and ulcers 7.2%. In study of Colgecen E *et al*.[21] most common cutaneous manifestation was contact dermatitis (50%). Fungal infection occurred in 2(2.8%) and bacterial infection in 7(10%).

CONCLUSION

Cutaneous problem of stumps due to prosthesis

1. Mechanical induced problems- Pressure ulcer, Erosion and Abrasion, Epidermoid cyst, Callus
2. Allergic reaction: stump edema, eczema, allergic contact dermatitis, rash
3. Infection : Bacterial Infection - cellulitis, folliculitis Fungal infection - candidiasis and dermatophyte infections
4. Vascular Occlusion: Purpura, necrosis (death of tissue), ulceration, Verrucous Hyperplasia due to venous congestion and/or lymphedema
5. Cancers like Intra-epithelial carcinoma and squammous cell carcinoma.

Proper stump hygiene is often effective in alleviating or averting some of these conditions.

The skin of the amputation stump in lower limb amputees is influenced by the use of a prosthesis. So several group of skin problems may occur in these lower limb amputees.

Adverse physical, mental and emotional effects of stump dermatoses may affect well being and quality of life of patients. Early recognition and treatment of these conditions can avoid loss of social and economic activity.

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