

## Skin problems of amputees using upper limb prosthesis

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**Objective:** To evaluate burden of skin problem in prosthetic users.

**Methodology:** In this observational or cross-sectional survey was performed at Department of Orthopedics Surgery and Traumatology, Myo Hospital, Lahore from March to September 2020. Data were collected by using Self-made questionnaire from already diagnosed upper limb prosthetic users. Cronbach's Alpha value was 0.63.

**Results:** Out of 66 patients, 44 (66.7%) had skin

problems. Most predominant skin problems was irritation seen in 21 (31.82%) patients. Others were ulcers, inclusion cysts, blisters and other than these problems seen in 3 (4.55%), 5 (7.58%), 6 (9.09%) and 9 (13.64%) patients, respectively.

**Conclusion:** Skin problems are most frequent complications for upper limb prosthetic users that create hindrance in activity.

**Keywords:** Amputees, upper limb prosthesis, skin problems.

## INTRODUCTION

Amputations of upper limb are cause of severe functional loss, lower the self-body image of patient and also impacts badly on psychological condition.<sup>1</sup> Absence of tactile feedback or force, reduces hand grasp abilities.<sup>2</sup> There are about 2 million individuals in US who are living with amputation.<sup>3</sup> To prevent epidermis from damage such as infection, irritation and breakdown, skin of stump must be cared accurately.<sup>4,5</sup>

Most common problems related to socket of prosthesis comprised sweating and heat in socket of prosthesis (72%) as well as skin irritation and sores from prosthetic socket (62%).<sup>6</sup> Poor perfusion is reason of skin diseases in amputees suffering with peripheral vascular disease and diabetes mellitus, whereas mechanical stress are reasons of skin problems in healthy and active amputees.<sup>7</sup> High pressures application on the skin in an irregular way, may cause pressure sensitive skin, ulcers, irritations and partial or total vascular occlusions.<sup>8,9</sup> Economic, social and mental rehabilitation can be threaten by mistreatment or negligence.<sup>10</sup> These skin problems can be easily corrected by modifying socket and suspension system.<sup>11,12</sup> The aim of this study was to identify frequency of skin problem and predominant type of skin problem among upper limb prosthetic users.

## METHODOLOGY

This observational or cross-sectional survey was conducted at Department of Orthopedics Surgery and Traumatology, Myo Hospital, Lahore from March to September 2020. Online calculator EPI tool was used to calculate sample size.

$$n = \frac{z_{1-\alpha/2}^2 P(1-P)}{d^2}$$

We used Self-made questionnaire and included already diagnosed upper limb prosthetic users of either gender. Cronbach's Alpha value was 0.63. Convenient sampling technique used. Age and age at the time of amputation and gender, level of amputation, cause of amputation, status of employment, type and presence of skin problem were recorded.

**Statistical Analysis:** The statistical analysis was performed by SPSS 24. For categorical variable Chi square test was applied.  $p < 0.05$  was considered statistically significant.

## RESULTS

The study included 66 upper limb prosthetic users. Age was 26 to 71 years. Trans radial and trans humeral amputees were 45 (68.2%) and 21 (31.8%), respectively. Patients had congenital deformity 24 (36.3%), trauma 22 (33.3%), cancer 5 (7.6%) and burn 15 (22.7%). Employed and unemployed patients were 51 (77.2%) and 15 (22.7%), respectively.

Out of 66 patients, 44 (66.7%) were suffering from skin problems and 22 (33.3%) were without any skin problem. The most predominant skin problems was irritation as 21 (31.82%) patients were suffering from this. Other problems noted were cysts, blisters and other than these problems were 3 (4.55%), 5 (7.58%), 6 (9.09%) and 9 (13.64%), respectively (Table 1).

**Table 1: Skin problem frequency.**

Skin Problems	Frequency	(%)
Ulcers	3	4.5
Irritation	21	31.8
Inclusion Cysts	5	7.6
Blisters	6	9.1
Others	9	13.6
None	22	33.3
Total	66	100.0

## DISCUSSION

In our study, 66.7% patients had skin problems, most common being irritation. A study on skin problem of lower limb found that 78% Trans-Femoral amputees and 59% Trans-Tibial amputees had skin problems due to prosthetic socket.<sup>13</sup> Irritation was in 31.8% amputees in our study. Another study reported that amputees that with prosthetic devices had skin problems between 32% and 90.9%. These problems may be excessive sweating, irritation and wounds.<sup>14</sup>

Colgecen et al, reported skin problems in 70% cases allergic reaction like contact dermatitis in (45.7%).<sup>15</sup> Braaksma et al, found skin problems in 18% out of 195 patients using prosthesis.<sup>16</sup> Darter et al, reported low of about 18% to as high as 75% skin problems while using prosthesis, mainly from sweating.<sup>17</sup> Excessive or overloading by application of prosthesis and excessive sweating on skin of stump causes skin problems.<sup>18</sup>

All of the above studies found that prosthetic users had skin problems, percentage and predominant type of problem may change in different studies. Variations in results are due to difference of population, sample size and geographical area.

Skin problems are most frequent complications for upper limb prosthetic users that create hindrance in activity. These can be due to poor hygiene, poor or loose fitting of prosthetic socket, inappropriate suspension system and relative motion between socket and stump. These can be minimized by good hygiene, properly fitted prosthetic socket and modification in suspension system.

## CONCLUSION

We found that 66.7% patients with upper limb prosthesis were suffering from skin problems. Most predominant problem was irritation.

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**Conflict of Interest:** None declared.

Rec. Date: Nov4, 2020 Revision Rec. Date: Jun 25, 2021 Accept Date: November 18, 2021.

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