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Physical Medicine

ASSESSMENT OF FUNCTIONING IN PERSONS WITH UNILATERAL LOWER LIMB AMPUTATION USING SUBSETS OF INTERNATIONAL CLASSIFICATION OF FUNCTIONING, DISABILITY AND HEALTH (ICF)

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ABSTRACT

Background- The International classification of functioning, disability and health (ICF) is a comprehensive and universally accepted framework to describe and classify functioning, disability and health in patients.

Purpose- To determine the functioning in patients with unilateral lower limb amputation through the selected subsets of ICF in two levels of amputation i.e. transtibial and transfemoral amputation with comparison of the functioning according to their levels of amputation.

Method- Questions framed according to the guidelines of the codes of the different categories of ICF from the domains of 'Body Functions', 'Activities and Participation' and 'Environmental Factors' were asked to each patient in the study.

Results- Fifty patients (35 males and 15 females) with median age of 43.5 years and level of amputation as transtibial (70%) and transfemoral (30%) were included in the study. On comparing between two groups of amputation, the difference in the result of the functioning of skin structure (s810), maintaining the body position (d 415) and Individual attitudes of immediate family members (e 410) were found to be statistically significant.

Discussions- Although all patients had completed comprehensive rehabilitation following lower limb amputation they still experienced several impairments, limitations and restrictions. Rehabilitation team members should address these factors for functioning of persons following lower limb amputation.

Conclusions- Lower extremity amputees who completed comprehensive rehabilitation still experience several impairments, limitations and restrictions.

KEYWORDS : ICF, Lower limb amputation, Rehabilitation, Disability, Functioning, Environmental factors

INTRODUCTION

Lower limb amputation is a chronic health condition and a common cause of long- term disability. It has a major impact on almost every aspect of a person's life and is a truly life-altering event, affecting the physical, functional, and psychological dimensions of a person's world[1]. The decision to amputate a limb is not made lightly; amputation is performed as a lifesaving measure for those affected by severe trauma[2], infection[3], peripheral arterial disease.[4]

In South-East Asia, the prevalence of disability ranges from 1.5% to 21.3% of the total population, depending on the definition and severity of disability.[5] In the Western world, peripheral vascular disease with or without diabetes accounted for 80-90% of all amputations.[6,7] Similarly, in the United States, vascular problems accounted for 82% of all amputations.[8] On the other hand, in developing countries, trauma is the main cause of amputation[9] and males are more prone to traumatic accidents than females.[10]

According to World Health Organization, India has the highest number of road accidents in the world with 16.8 fatal injuries per 100,000 population, and 38.9 non-fatal injuries per 100,000 populations as per the data from 2006.[11] A cross-sectional study reported vehicle accidents as the major cause of amputation.[12] Apart from road accidents, train accidents especially due to over-crowding, and other traumatic injuries due to infrastructural challenges posed by increasingly growing population and rapidly expanding economy would be contributing towards this. Lastly as per the estimates of the World Diabetes Foundation, about 40,000 lower limb amputations are performed each year in India due to diabetic complications.[13] The International Organization for Standardization (ISO) terminology for the description of acquired lower limb amputations are the following as Hemipelvectomy, Hip disarticulation Transfemoral, Knee disarticulation, Transtibial, Ankle disarticulation, Partial foot, Digit(s).[14]

The numerous clinical studies and research reports on function and health-related quality of life following amputation describe a wide range of outcomes. There are multiple interactive variables that contribute significantly to the functional outcome, including medical co-morbidities, the surgical level of amputation, cognition, age, pre-morbid level of function, personal coping style, and level of social support, environmental factors and financial resources available.[9]

The current functional classification systems and outcome measures for persons with amputation are often tailored to local needs, and there is a lack of consensus regarding uniform or the most appropriate outcome measures.[19-21] For example, the K classification system mandated in the USA and in some Australian states, classifies only the functional mobility with the use of prosthesis for a person with an amputation. Although the K classification is a relatively simple functional scale, there are no clear guidelines for the exact process of how to categorize an individual into the five levels of function in the classification.[22]

Since the endorsement of the International Classification of Functioning, Disability and Health (ICF) by the World Health Assembly in May 2001, a comprehensive and universally accepted framework to describe and classify functioning, disability and health in individuals with amputation has been available.[23]

The ICF classifies functioning into the components of body structures and functions, activities and participation, environment and personal factors. Personal factors are currently not categorized in the ICF.[19] ICF contains a total of 1495 meaningful and discrete or mutually exclusive categories and taken together; cover the whole spectrum of human functioning.

Each code has a definition along with inclusion criteria and exclusion criteria. The questions are to be asked to the patients keeping with this definition. The qualifiers for each category are accordingly marked as per patient's statement to denote the extent of problem in his/her current health condition.

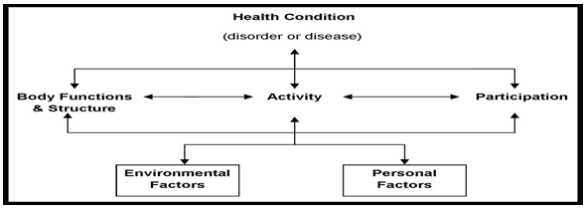

Fig.-1 ICF Model

AIM AND OBJECTIVES-

- To determine the functioning in patients with unilateral lower limb amputation through the selected subsets of International classification of functioning, disability and health [ICF] in two levels of amputation i.e. transtibial and transfemoral amputation.
- To compare the functioning in the patients with amputation according to their levels of amputation.

MATERIAL AND METHODS-

Study Design: Observational cross sectional study

Study Duration: September 2016 to January 2018

Samples Size & Rationale: 50 cases.

Sample size had been calculated with help of Epi Info (TM) 3.5.3. EPI INFO which is a trademark of the Centres for Disease Control and Prevention (CDC). The study was an observational study. As per the study by Lahiri S et al.[24] the most common cause of amputation was trauma (70.3%). Thus for this study p= 0.703. The number of subjects required for this study was 50.46 ~ 50 with power 82%. The formula used for sample size calculation is as follows:-

$n = 4pq/L^2$

where, n= required sample size, p= 0.703 as per the study by Lahiri S et al.[63] q = 1 – p, L = Loss % (Loss of information)

Calculation:

Here p=0.703, q=1-p=0.10, Loss% = 18%
4pq = 4 X 0.703 X 0.297 = 0.8352
L^2 = (0.703 X 0.18)^2 = 0.0166
So n= 0.8352 / 0.0166=50.46 ~ 50

Study Technique:

The patients visiting to the outpatient department of National Institute for Locomotor Disabilities (Divyangjan), Kolkata-700090, were first screened according to inclusion and exclusion criteria. The patients who fulfil inclusion and exclusion criteria were approached with the proposal of the study. Aim of the study and procedure were explained and a written consent was taken from patients, who agreed to participate. Thorough history and physical examination were done as per Study Performa. The information and responses of the patients to the interview were to be noted on the subsequent pages of the patient 'data sheet'. The patient data sheet contains the different subsets of ICF categories. Patients were asked about each body function, body structure and activities and participation. Each code has a definition along with inclusion criteria and exclusion criteria. The questions were asked to the patients keeping with this definition. The qualifiers for each category were accordingly marked as per patient's statement to denote the extent of problem in his/her current health condition.

A disability of 0-4% was rated as “disability none”. A disability of 5-24% was rated as “disability mild”. A disability of 25-49% was rated as “disability moderate”, 50-95% as “disability severe/serious” and 96-100% as “disability complete”. Now the categorization is as such

“A” denotes to disability none.
“B” denotes to disability mild and moderate.
“C” denotes to disability severe and complete.

Patients were to be asked to rate each 'Environmental factors' as a barrier or a facilitator in their present health condition. The responses were noted as

No Barrier: [A], Facilitator: [B], Barrier: [C], Not applicable: [D]
Apart from these a few data were also to be noted:

- Level of lower limb amputation
- The cause of injury
- Aids and appliances received
- The pre injury occupation

The selected Body function subsets were -
b 152 : Emotional functions
b 180 : Experience of self and time function
b 28015 : sensation of pain
b 770 : Gait pattern functions

The selected Body structure subset was-
s 810 : Skin structure
The selected Activities and participation subsets were -
d 130 : Copying
d 415 : Maintaining a body position
d 450 : walking
d 470 : Use of transportation
d 530 : Toileting
d 920 : Recreation and leisure

The selected Environmental factors subsets were-
e1151: Assistive products and technology for personal use in daily living

e1201:Assistive products and technology for personal Indoor and outdoor Mobility and transportation

e 210 : Physical geography

e 310 : Immediate family

e 325 : Acquaintances, peers, colleagues, neighbors and Community members

e410 : Individual attitudes of immediate family members

e425: Individual attitudes of acquaintances, peers, colleagues, Neighbors and Community members

Statistical Analysis-

Statistical Analysis was performed with the help of Epi Info (TM) 7.2.2.2. EPI INFO is a trademark of the Centers for Disease Control and Prevention (CDC). Descriptive statistical analyses were performed to calculate the means with corresponding standard deviations (s.d.). Test of proportion was used to find the Standard Normal Deviate (Z) to compare the difference proportions and Chi-square (c^2) test was performed to find the associations. In the cases where one of the cell frequencies were less than 5 corrected Chi-square (c^2) was used to find the association between variables. t-test was used to compare the means. Row% was used to compare the percentage between two groups and Column (Col)% was used to compare the percentage within a group. $p<0.05$ was taken to be statistically significant.

RESULTS-

Fifty patients in most common age group 21-40 yrs, with males(70%) and mostly married (78%) and professionally active (62%) with educational qualification of 'middle school certificate' of Kuppuswamy education score[25] (62%).Trauma (82%) was the most common cause of amputation with transtibial amputation(70%) being the commonest level. The age of amputation was mostly 1-5 yrs (50%) with time since using the prosthesis was of less than one year(46%). The patients of the two groups (Transtibial and Transfemoral) were matched for their age, sex, marital status, occupation, level of education, etiology, level of amputation, the age of amputation and the time since using current prosthesis.

There was significantly higher proportion of no disability in the functioning of gait pattern function (b770), skin structure (s810), maintaining body position (d415), walking (d450), use of transportation (d470) in the patients with Transtibial amputation. There was significantly higher proportion of no disability in the functioning of pain in lower limbs (b28015) and no barrier impact on the environmental factors including assistive products and technology for personal use (e1151), assistive products and technology for indoor and outdoor mobility (e1201), individual attitudes of immediate family members (e410) in the patients with transfemoral amputation.

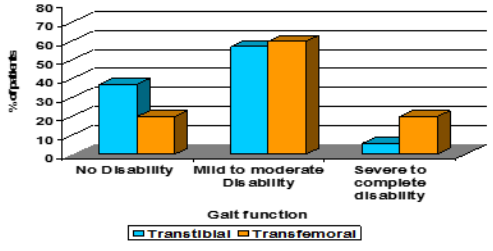

Fig.- Proportion Of Patients With No Disability Was Significantly Higher In Transtibial Level Of Amputation (37.1%) As Compared To Transfemoral Level Of Amputation (20.0%) (z=2.67;p<0.01).

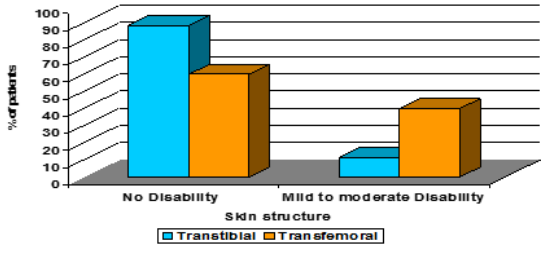

Fig.- Proportion of patients with no disability was significantly higher in Transtibial level of amputation (88.6%) as compared to Transfemoral level of amputation (60.0%) (Z=4.62;p<0.0001).

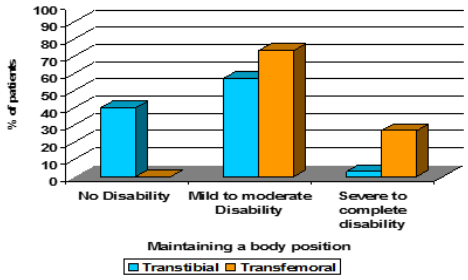

Fig.- Proportion of patients with no disability was significantly higher in Transtibial level of amputation (40.0%) as compared to Transfemoral level of amputation (0.0%) (Z=7.07;p<0.001).

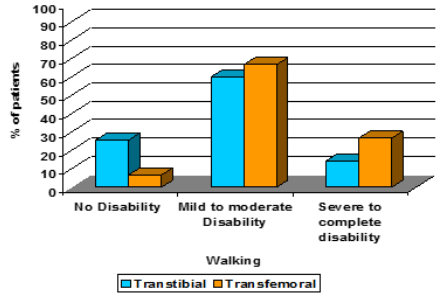

Fig.- Proportion of patients with no disability was significantly higher in Transtibial level of amputation (25.7%) as compared to Transfemoral level of amputation (6.7%) (Z=3.64;p<0.001).

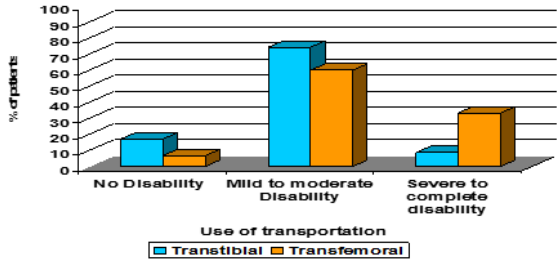

Fig.-Proportion of patients with no disability was significantly higher in Transtibial level of amputation (17.1%) as compared to Transfemoral level of amputation (6.7%) (Z=2.27;p<0.05).

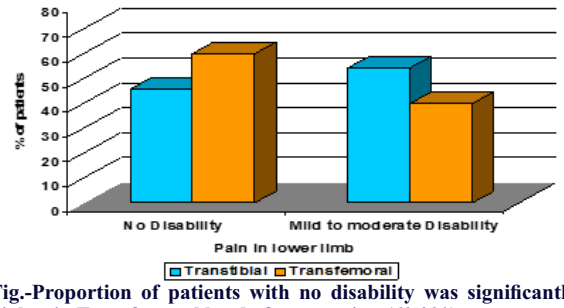

Fig.-Proportion of patients with no disability was significantly higher in Transfemoral level of amputation (60.0%) as compared to Transtibial level of amputation (45.7%) (Z=2.02;p<0.05).

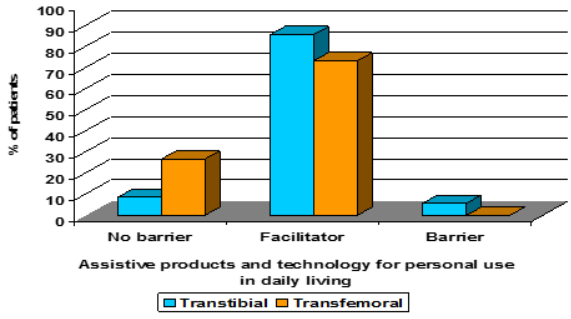

Fig.- Proportion of patients with no barrier was significantly higher in Transfemoral level of amputation (26.7%) as compared to Transtibial level of amputation (8.6%) (p=3.35; p<0.001).

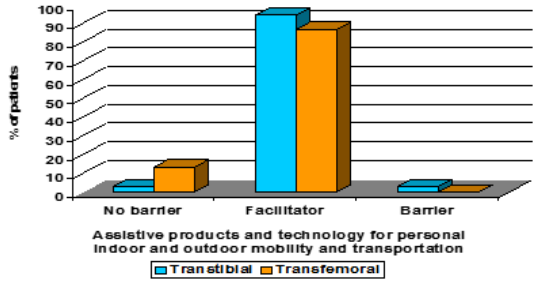

Fig.-Proportion of patients with no barrier was significantly higher in Transfemoral level of amputation (13.3%) as compared to Transtibial level of amputation (2.9%) (p=2.69; p<0.01)

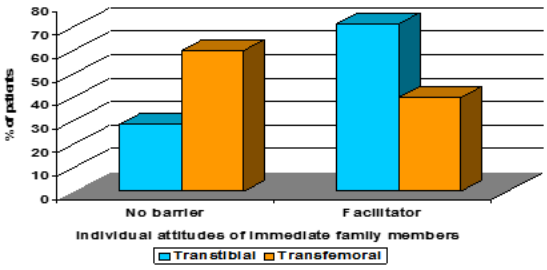

Fig.-Proportion of patients with no barrier was significantly higher in Transfemoral level of amputation (60.0%) as compared to Transtibial level of amputation (28.6%) (p=4.46; p<0.0001).

On comparing between two groups of amputation, the difference in the result of the functioning of

- skin structure (s 810),
- maintaining the body position (d 415) and
- Individual attitudes of immediate family members (e 410) were found to be statistically significant.

LIMITATION OF STUDY-

- There is lack of published studies on the application of ICF on amputation in an Indian Setting. Thus the references were drawn from International studies as well as epidemiological studies in relation to amputation from India.
- Majority of studies on application of ICF on amputation are multicentre studies often involving more than one country and sometimes multidisciplinary. This study being a single centre study, a smaller sample size could be taken.
- Further follow up is required to study the implementation of different treatment strategies and the changes in the qualifiers of the categories.

CONCLUSIONS-

- The present study highlighted not just the medical aspects of the patient's condition but also how the patient was functioning in environment and dealing with the different functional, social as well as external barriers in his day to day life.
- From the patients' perspective such detailed interview regarding his experience was reassuring and helped in building an intimate doctor patient relationship. From the physician's aspect, this ICF based data helped in planning a constructive individualised rehabilitation programme.
- An ICF based tool or software would be ideal for implementation of preventive and curative measures at the personal, societal as well as the national level.
- Patients following lower limb amputation who completed comprehensive rehabilitation still experience several impairments, limitations and restrictions.

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