Journal of Population Therapeutics & Clinical Pharmacology

RESEARCH ARTICLE
DOI: 10.53555/v66yj969

LEVEL OF PHYSICAL ACTIVITY AMONG LOWER LIMB PROSTHESIS USER IN PUNJAB, PAKISTAN

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ABSTRACT:
Amputation is foremost cause of disability accompany by isolation, anxiety, depression that alter physical and social activity of amputees. Lower limb Amputation (LLA) alter gait pattern, change in balance and increased energy expenditure. Prosthetic functioning depends on motivation, physical performance ability and confidence to use prosthesis in different activities. The main purpose of this study is to determine level of physical activity among people having lower limb amputation. Data of lower limb amputee were collected from different regions of Pakistan i.e. Siddique Orthopedic Rehabilitation Complex, Faisalabad, Lahore Limb & Rehabilitation Clinic, Lahore and National Institute of Rehabilitation Medicine, Islamabad by convenience sample and completed International Physical Activity Questionnaire. Three hundred and eighty-five (385) individuals, age range from 18-80 years were participated in this study. Out of 385 patients, 301 were male and 84 were female. 58.7% had transtibial amputation. 25.7% undertook lower level of physical activity, 67.8% undertook moderate level while 6.5% had high level of physical activity, however, total physical activity level was lower 1111.5 (1044). Physical activity was significantly lower among unemployed participants and individual with dysvascular amputation. Household (Domestic) activity and Moderate intensity activity were most commonly undertaking by participants. These findings provide further insight about participation in physical activity and may guide clinician to increase physical activity by focus on specific domain in lower limb amputees.

Key Words: Amputation, Lower limb amputation, Physical activity

Introduction:

Physical activity is “any bodily movements produced by skeletal muscles that result in energy expenditure”[1]. To prevent and treat disease by use of physical activity is an ancient concept. It increases durability of life and stimulates psychological wellbeing in healthy individuals. It can be beneficial to Individual who faces physical or psychological challenges, or both, as supported by many international health communities[2].It is related with physical fitness and considered as positive

factor in rehabilitation of amputees[3]. Physical activity depends on individual's performance ability, inspiration and confidence to use prosthesis in different condition[4]. A number of challenges face by individual with lower limb amputation (LLA) to reintegrate into community succeeding rehabilitation. Ability to maintain a healthy level of physical activity is one of them. Lower limb amputees have low level of physical activity and individual without LLA are more active than individuals with LLA founded in literature. To engage in various leisure and productive activities is a second challenge faced by individuals with LLA. Lower limb amputee participates in fewer leisure activities compared to before amputation. High risk for falls is also present in Individuals with LL amputation. Gait differences, balance abnormalities, fear of falling and balance confidence are different factors contribute to higher risk of falling. Prolonged inactive lifestyle leads to increase risk for falling because of weakness and atrophy of muscle accompanying with sedentary life style. By increasing one's level of physical activity, fall risk can be minimized and also protect them against injury[5]. Barriers to accomplish activities among individuals with limb amputations are, older age, more proximal amputation and a vascular cause of amputation. Amputees were taking short time span if during rehabilitation program physical activity done[6].Individuals who face limb amputations and participate in physical and sports activities have high quality of life and self-esteem than those individuals with amputation who do not do such activities. Social contacts of amputees can be increased by participating in such kind activities. Amputees should be supported to acknowledge their disability and increase their motor skills. Amputees are less Participated in physical activities and sports due to physical restraints and accessibility issues following amputation. The ratio of individual with amputation who participate in physical activities is just 11%-61%. Younger unilateral transtibial amputees are more active due to non-vascular causes than vascular involvement in elderly amputees with bilateral transfemoral amputation. In traumatic lower limb amputations by short and intensive physical training, individual speed and walk distance can be improved.[7] Primary aim of this study was to find out level of physical activities among lower limb prosthesis user. Other aim of current study was to explore different type of physical activities preform by lower limb amputees.

Methodology:

This study was started after approval from advanced study & research committee (ASRC) of Isra Institute of Rehabilitation Sciences at Isra University, Islamabad. Individual with lower limb amputation were recruited through convenience sample technique from different regions of Pakistan i.e. Siddique Orthopedic Rehabilitation Complex, Faisalabad, Lahore Limb & Rehabilitation Clinic, Lahore and National Institute of Rehabilitation Medicine, Islamabad. The main criteria of sampling were to had individual with aged 18 year or older had unilateral amputation and using prosthesis for more than 4 weeks. Individuals with bilateral amputation, amputation at level of hip, had any comorbidities i.e. uncontrolled cardiovascular disorder, neurological disorder such as stroke, blindness and cognitive disability were excluded from study. All the member of this study had filled consent form. The entire members in this study were volunteer and unknown. Time duration of study was November 2023 to June 2024. Data was collected by using demographic form and international physical activity questionnaire (long form). Demographic form consists of name, gender, age, level of prosthesis, causes of amputation, occupation of amputees, history of fall, living style, and use of assistive aid by amputees. IPAQ comprise of 27 questions and used to measure physical activities across four domains (work, transport, domestic and leisure) in preceding seven days. It was selected due to its psychometric properties and extensive use internationally. It is an effective and reliable method for self-reporting physical activities that has previously been used in people with limb amputations.

Statistical Analysis:

''Guidelines for Data Processing and Analysis of the IPAQ'' were used to process and reporting of data from IPAQ. As per IPAQ guidelines incomplete and responses having very high scores i.e. more than 16 hours of physical activity, were excluded from analysis. Both "continuous and

categorical scores" of physical activities were used to report data collected from IPAQ regarding physical activity levels. "Metabolic equivalent of task (MET)-minutes/week" was used to express IPAQ continuous scores of physical activities. Physiological measure to represent individual's energy cost to accomplish different level of physical activities as a multiple of resting energy usage is called as "MET". "MET-minutes/week" scores were computed by multiplying the activity's MET score by the number of minutes it took to complete each day and the number of days it was done each week. According to guidelines, data regarding levels of physical activity collected from individuals on IPAQ were categorized as "high", "moderate" and "low" for categorical scores of physical activities. "High" activity was described as "either a combination of walking, moderate, or vigorous-intensity activities over seven days resulting in at least 3000 MET-minutes/week, or three or more days of vigorous-intensity activity resulting in at least 1500 MET-minutes/week". "Walking for 30 minutes or more, five days of moderate-intensity activity, three days of vigorous-intensity activity for at least 20 minutes per day, or five days of a combination of walking, moderate-intensity, or vigorous-intensity activity that results in at least 600 MET-minutes/week" are all considered forms of "moderate" activity. People who did not engage in enough activity to fulfill the requirements for "moderate" or "high" activity were placed in the "low" activity category. Relationship between age and total physical activity performed by participants was analysis by using correlation coefficient.

Results:

The mean age of amputees was 44.66±13.76 from the age range of 18-80 years. Out of 385 patients, 301 were male and 84 were female. Demographic characteristics showed in Table 1. In Table 2, "median physical activity continuous score" from international physical activity questionnaire was showed. According to IPAQ categorical scores of physical activity, 25 (6.5%) participants were categorized as "high level of physical activity'', 261 (67.8%) participants were undertaking "moderate level of physical activity" and 99 (25.7%) participants were in "low" level of physical activity'' as showed in Table 3. Total physical activity continuous score was negativity correlated with age of participants r_s (385) = -.368, p value= 0.00. Physical activity performed in different domain of IPAQ represented in figure 1.

Table 1: Demographics Characteristics

Demographics Characteristics		**Frequency**	**Percentage**
Gender	Male	301	78.2
	Female	84	21.8
Level of Amputation	Transtibial	226	58.7
	Through knee	4	1
	Transfemoral	155	40.26
Cause of Amputation	Trauma	159	41.29
	Nerve injury	3	.8
	Diabetes	89	23.1
	Infection	58	15.1
Employed	Yes	157	40.8
	No	228	59.2
Type of Prosthesis	Conventional	225	58.4
	Modular	160	41.6
Assistive Devices	Yes	195	50.6
	No	162	42.1
	Irregular	28	7.3

Table 2: Physical Activity Continuous Score

Physical activity continuous score		Median	Interquartile
Domain	Work	72	693
	Active Transport	132	396
	Domestic	270	675
	Leisure	99	346
Physical activity intensity	Total Walking	462	726
	Total Moderate	480	945
	Total Vigorous	.000	.000
Total Physical Activity		1111.50	1044

Table 3: Level of physical Activity

Physical Activity	Frequency	Percentage
Low physical activity	99	25.7
Moderate physical activity	261	67.8
High physical activity	25	6.5
Total	385	100

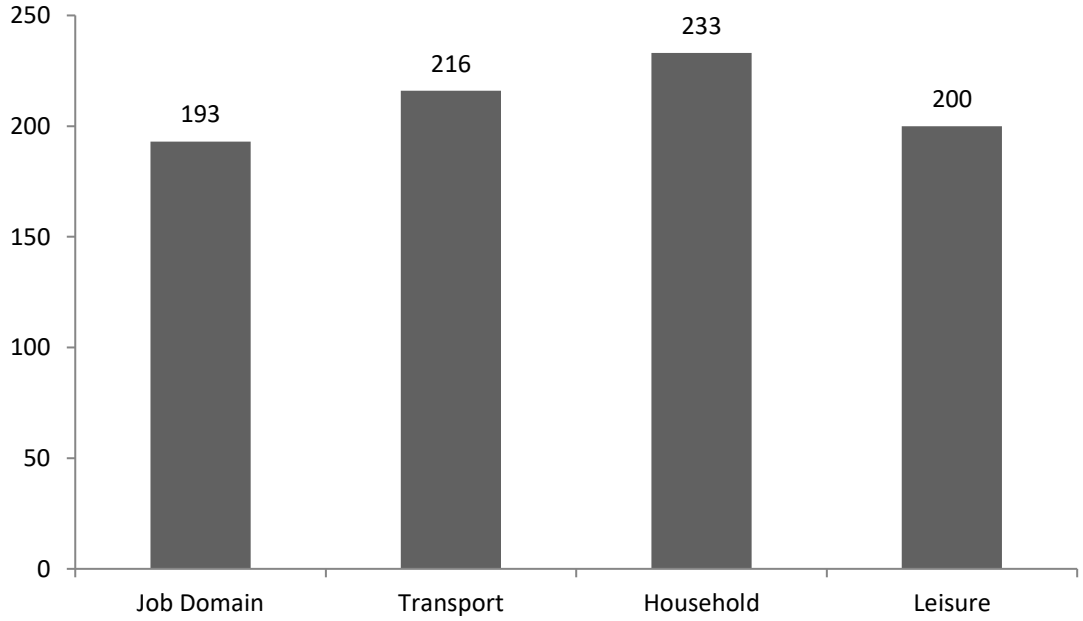

Figure 1: Domain of physical activity

Discussion:

In current study, most of participants were male and had unilateral transtibial amputation that was comparable to data related to LLA [8,9]. The rate of different etiological agents, which may lead to amputation, was 41.29 % due to trauma, 23.1% for diabetic, 15.1% got amputation due to infected wounds, 0.8% was amputated due to nerve injury [10]. The finding of the current study was relatively similar to the Silva et al., 2011 because the incidence of amputation higher in non-vascular than vascular[11]. It may be higher due to road traffic accident, gunshot injury, mechanical injury, bomb blasts and family dispute. 40.8% participants were unemployed and dependent on their family members and 59.2 % participants were doing different work. Results of present study were similar to study conducted by Langford et al in 2018[12]. 58.4% patients were using conventional prosthesis and 41.5% were using modular prosthesis.

Physical activity participation among LLA individuals, who attended outdoor patient, was examined in current study. Participants were categorized as “high", "moderate" and "low” physical activity level according to IPAQ. Most of participants (n=261, 67.8%) had lower level of total physical activity than 3000 MET-minutes/week which defined as “sufficient total physical activity”.

While 25.7% (n=99) had total physical activity levels of less than 600 MET-minutes per week, their activity level was classified as "sedentary," indicating a risk of low total physical activity levels[26]. Domestic activity was the most common physical activity performed by participants, followed by transportation, leisure time, and job domain physical activity. Individuals with dysvascular amputation had lower physical activity levels.

Most of participants had “high” or “moderate” levels of activity as compare to previously available literature in which most of participants with lower limb amputation had “low” level of physical activity[13]. Main reason of higher percentages of high and moderate physical activity participants in present study was due to non-dysvascular amputation. Participants having non-dysvascular amputation had significantly higher levels of physical activity as compare to participants having dysvascular amputation. In current study, mean “total physical activity” was lower than 3000 MET-minutes/week which is recommended for health related benefits when all physical activities included. This suggested while some individuals could achieve health benefits through sessions of physical activity but collectively was at risk of low level total physical activity. Although, most of participant was categories as high and moderate physical activity but total physical activity levels was low. This showed that short but intense sessions of physical activity were followed by longer period of sedentary behavior, which indicates high mortality risk[14]. Moreover, higher total physical activity is related to lower risk of ischemic heart disease, diabetes, colon and breast cancer. These risk factors can be reduced when total physical activity levels of participants were between 3000–4000 MET-minutes/week but most of participants in current study (67.8%) achieved score lower than 3000 MET-minutes/week of total physical activity[15]. About 99 (25.7%) participants were classified as “low” physical activity levels which means that they were unable to achieve minimum “moderate” physical activity levels even in short sessions of physical activity. Lower levels of physical activity related with lower community participation among individuals with LLA[16].

In current study, participants mostly undertook domestic-related activity that was supported by previous research[17]. Job-related activities were the least common category of physical activity participation, with nearly half of participants engaging in any physical activity for leisure. These results suggested that physical activities performed by participants were mostly linked to work that needed to be done rather than activities individuals might chose deliberately like leisure-related activities. Physical activity of amputees may be increased by increasing leisure related activity[18]. Family support could play a key role in physical activity participation that supports results of current study. Other factors like dynamics of living arrangements might also affect type and level of physical activity[19].

Conclusion:

Most of participants did not perform recommended amount of physical activities for healthy population. Level of physical activities was lower among those participants who was unemployed and had dysvascular amputation. Household (Domestic) activity and Moderate intensity activity were most commonly undertaking by participants. These findings provide further insight about participation in different physical activity and may guide clinician to increase physical activity by focus on specific domain in lower limb amputees.

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