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Assessment of Health-related Quality of Life in Transfemoral Amputees: A Single Centre Cross-Sectional Study

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ABSTRACT

This study explores the Dark Triad "in action" by examining how attention seeking and narcissism contribute to antisocial behavior among young adults in academic environments with the help of the Dark Triad theory. The model proposes that individuals who frequently engage in attention-seeking behaviors may possess deeper narcissistic tendencies, which ultimately translate into aggressive, manipulative, or socially disruptive behaviors. Fragile self-esteem is incorporated as a moderating variable to capture internal psychological vulnerabilities that may intensify these relationships. Data were collected from a sample of 400 students aged 18 to 24 enrolled in colleges and universities. The proposed conceptual model was tested using Smarts through Partial Least Squares Structural Equation Modeling (PLS-SEM). Overall, the study contributes to a deeper understanding of how Dark Triad traits manifest in real-life settings and offers practical implications for identifying and managing antisocial behaviors among university students.

Introduction

Physical rehabilitation focuses on the restoration of body functions after activity limitations caused by diseases or disorders.[1] Physical rehabilitation through prosthetic devices involves the restoration of the body parts through artificial parts, limbs or devices which facilities body movements, and improve professional and social participation of the amputees.[2,3] Physical activities are not limited to merely the movement of the muscles or body parts, as it has been defined in the literature, any bodily movement produced by skeletal muscles that results in energy expenditure. But it includes all the daily and routine life activities, ranging from self-care and basic activities of daily life, to the advanced and professional activities.[4–6] Ambulation is the integral

part of human life, and all physical and societal needs are only possible with movement,[7] however, in people with lower limb amputations (LLAs), such movements are restricted and face huge challenges.[8] As data from most of the developing countries is unreliable or not available, statistics from the United States of America showed that 150,000 people may go under LLAs per year.[9] While focusing on the road traffic accidents, lack of road safety regulation, climate changes, natural disasters, military conflicts in the developing countries, the incidence and prevalence of LLAs may be much higher and can be expected to rise in the future.[10–12] while non-communicable disease is the major contributor of LLAs, thus it has been estimated that 68.6% of all amputations are contributed by diabetes mellitus.[13] As Pakistan is the world's leading country in diabetes prevalence, the prevalence of LLAs due to diabetes may also be much higher. as 69.8% of LLAs in Pakistani patients have been reported to be associated with poor glycemic control.[14]

Prosthetic devices help in gaining mobility, in reducing the negative impacts of disability and helping the amputees to remain independent. Due to advancements in technology and the availability of lightweight prostheses, patient mobility has been improved when compared to the conventional prosthesis. Although it has been conclusive that the use of prosthetic devices has physiological, physical and psychological benefits to amputees and improves the quality of life in patients.[15,16] Despite the availability of advanced technologies, most of the prosthetic users in Pakistan still rely on the conventional prosthesis.

Quality of life is the feeling of satisfaction with one's own life in general, although it is a multidimensional concept and is dependent on several factors of physical health and abilities. Mental health and wellbeing and, sociodemographic characteristics, and attainment of life goals.[17,18]

Amputation is the surgical or traumatic removal of a body part, finger, or toe, often necessitated irculation as a cause of diabetes, injury, trauma or infection. During surgical removal,, the damaged portion is removed while sustaining the maximum possible healthy tissues and body parts. Transfemoral amputation refers to the removal of the body part, cutting thethigh above the knee and below the hip joint.[19]

The aim aim of the current study was to evaluate Quality of Life (QoL) in Transfemoral (TF) prosthetic users visiting different rehabilitationcentres in Khyber Pakhtunkhwa (KPK).

Methods

The cross-sectional study was carried out at a rehabilitation centre in Lower Dir, Timergara, Khyber Pakhtunkhwa, Pakistan. Ethical approval was obtained from the study settings in January 2024, and data collection was carried out from January 2024 to April 2024. The centre has registered 85 Trans-femoral amputees, out of which 60 were included in the study based on the eligibility criteria. Inclusion criteria were defined as patients at least eighteen years old, irrespective of gender identity, using the traditional ICRC (International Committee of the Red Cross) Transfemoral prosthetic device, with a minimum history of amputation of six months; the patient was using the prosthetic device for at least three months continuously and agreed for voluntarily participation in the study. Patients were excluded if participants reported any discontinuation in use of the prosthesis, intermittent swelling in the limb or stump associated with underlying systemic disease, using more than one prosthetic device technology, or if patient information was incomplete in the Questionnaire. Non-probability consecutive sampling technique was used for data collection, and patients were selected from the Outpatient department at the study settings at follow-up visits. The World Health Organisation Quality of Life (WHOQoL) Questionnaire was used for assessing QoL in the studied participants. Support from the family and

caregivers was reported on a Likert scale ranging from 0 to 4; the mean score was calculated and reported with standard deviation. The physical pain was assessed on the numeric rating pain scale at the time of data collection and was categorised as no pain, mild, moderate, and severe pain.

Results

Out of the studied sixty participants, n=47 (78%) were male and n=13 (22%) were female. The mean age of the participants was 48.06±5.08, and the age ranged from 18 to 63 years in the studied participants. Among the studied participants, 35% were illiterate or had no history of formal schooling, and 51.7% were married. While 76.77% of participants had comorbidities or systemic diseases, diabetes was the most common in 30% of participants. The age, gender, and sociodemographic characteristics of participants have been reported in Table I.

Table 1: Sociodemographic Characteristics of Study Participants

SN	Variables	Frequency	Percentage
01	Age		
	18-30 years	0	0%
	31-45 years	17	28.3%
	46-60 years	41	68.4%
	61 years & above	2	3.3%
02	Gender		
	Male	47	78%
	Female	13	22%
03	Education Status		
	No formal schooling	21	35%
	Primary school	22	36.7%
	Secondary school	15	25%
	College or university level	2	3.3%
04	Marital Status		
	Single	28	46.7%
	Separated	1	1.6%
	Married	31	51.7%
05	Co-morbidities		
	No Comorbid conditions	14	23.3%
	Diabetes	18	30%
	Hypertension	15	25%
	Other systemic chronic conditions	13	21.7%

Support score from the family and caregivers was reported with a mean score of 2.48±1.16m as the total score falls within the category of poor to fair support. The following Figure 1 illustrates the number of participants falling within each category of support they were receiving from their families and caregivers.

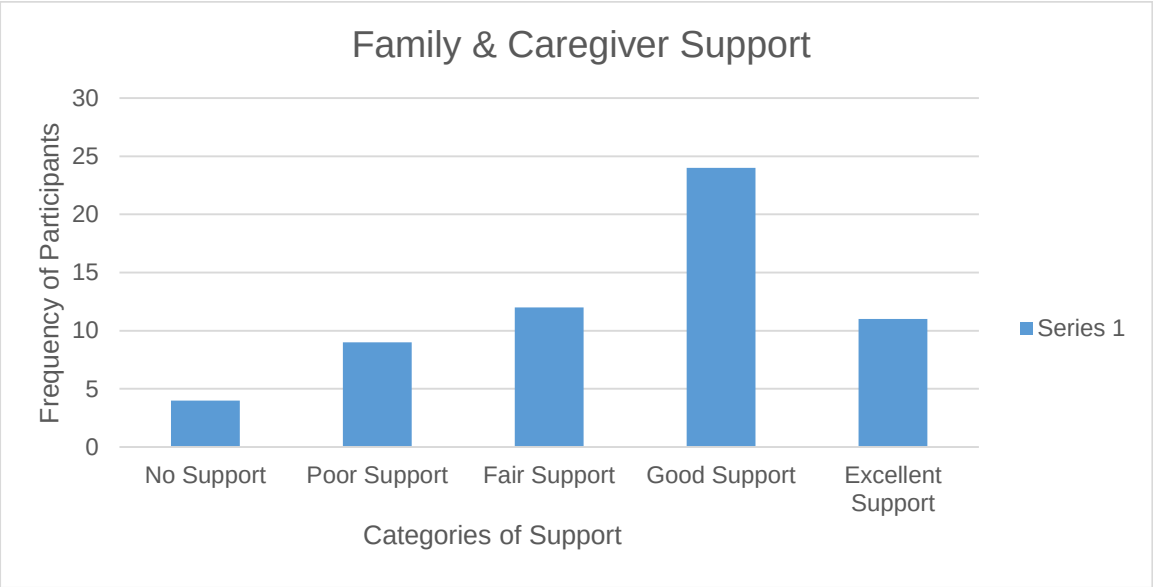

Figure 1: Family and caregivers' support provided to the Study participants

Based on the analysis of the WHO-HQOL questionnaire, the mean score of the participants was 55.20±13.80, with 24 participants in the low QoL, 30 in the moderate QoL and 6 participants in the High QoL category. Categories of the participants have been reported in Figure 2.

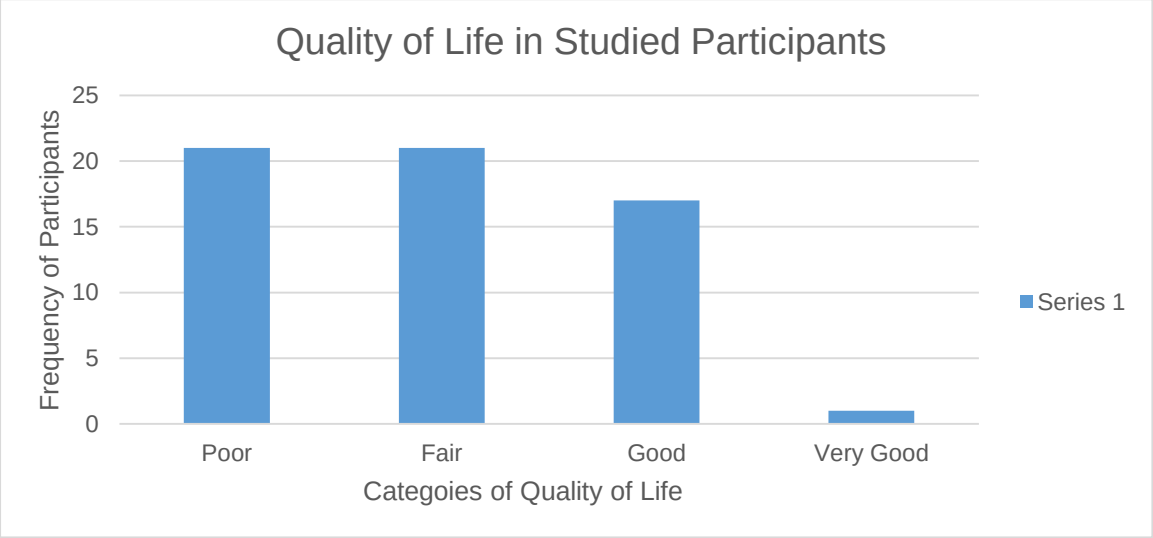

Figure 2: Categories of Quality of Life in the study participants

In the studied participants, an equal number of participants were reported in the Poor and fair category of Quality of life. In the same way, satisfaction with health was reported in 43% of participants, poor and fair satisfaction was reported in 57% of participants.

Pain assessment reported no pain in 15 (25%), Mild pain in 12 (20%), Moderate pain in 14 (23.33%) and severe pain in 19 (31.66%) of the participants. For all the variables, Pearson correlation was applied to study the association.

Table 2: Pearson correlation of the study variables with Quality of life in Study participants

Variable	Pearson Correlation (r)	p-value	Significance
Gender	0.08	0.542	Non-Significant
Age	-0.42	0.001**	Significant
Monthly Income	0.38	0.003**	Significant
Marital Status	0.11	0.402	Non-Significant
Pain Level (VAS)	-0.54	< 0.001**	Significant
Physical Activity	0.49	< 0.001**	Significant

Age (r = -0.42): The moderate negative correlation confirms that younger patients in your study (likely the traumatic amputation cases) report a significantly higher Quality of Life than the older cohort (46–60+), who face the double burden of ageing and comorbidities. Income (r = 0.38): Higher income is positively associated with QoL. In the context of the DHQ hospital, this likely reflects the ability to afford better prosthetic components, private physiotherapy, or modified transport. Pain Level (r = -0.54): This is your strongest correlation. For a TF amputee, residual limb pain or phantom limb pain is a major barrier to both physical function and psychological well-being. Physical Activity (r = 0.49): There is a strong positive relationship here. Patients who engage in more physical activity, likely due to better prosthetic fit or higher motivation score, are significantly higher on the WHOQOL scale. Non-Significant Factors: Gender and Marital Status do not show a statistically significant relationship with QoL in this specific sample, suggesting that the physical and economic factors are more dominant drivers of well-being for these patients.

Discussion

This study, conducted in a rural district of Khyber Pakhtunkhwa, Pakistan, assessed the quality of life (QoL) and associated factors among lower-limb amputees. The key findings revealed that the majority of participants were male (78%), middle-aged (mean 48.06±5.08 years), and had comorbid conditions (76.77%), with diabetes being the most prevalent (30%). The mean QoL score was 55.20±13.80, indicating a moderate-to-low overall QoL. Notably, 45% of participants reported moderate-to-severe pain, and family support was poor-to-fair (mean 2.48±1.16). Pearson correlation analysis demonstrated that younger age, higher monthly income, lower pain levels, and greater physical activity were significantly associated with better QoL. In contrast, gender and marital status showed no significant association.

Age (r = -0.42, p = 0.001): The moderate negative correlation between age and QoL is a critical finding. Younger amputees (18–45 years) reported significantly higher QoL compared to older participants (46–60+ years). It has been consistent with earlier evidence, with a publication from India which reported better QoL in amputees with younger adults, while QoL decreased with an increase in age.[20]

Monthly Income (r = 0.38, p = 0.003): Higher income positively correlated with QoL. Income status has been a strong and positive predictor of improvement in QoL and social development, in the general population other than amputees as well.[21] Thus, it may not necessarily be correlated with the use of a prosthetic device.

Pain Level (r = -0.54, p < 0.001): This was the strongest negative correlate of QoL. Over 31% of participants reported severe pain. Thus, an increase in pain was associated with lower QoL. Pain associated with prosthetic use has been evident in lower limb amputees, and it exhibits a negative implication on QoL in prosthetic users, even old prosthetic users with a usage history of >5 years,[22] while it may have even larger negative implications on new prosthetic users.

Physical activity ($r=0.49$, $p<0.001$), the strong positive correlation supports the biopsychosocial model of rehabilitation. An increase in physical activities influences QoL in a positive and better way in the study participants.[23] Gender ($r = 0.08$, $p = 0.542$): Despite the male predominance (78%), gender did not significantly predict QoL. The study included a predominantly male population. Marital Status ($r = 0.11$, $p = 0.402$): While 51.7% were married, marital status did not correlate with QoL.

The findings align with international evidence that amputees in low- and middle-income countries (LMICs) have lower QoL compared to high-income countries.[24] The strong pain-QoL relationship mirrors studies from sub-Saharan Africa and Southeast Asia, where inadequate post-amputation pain management remains a systemic failure.

National data on amputee QoL is sparse. This study fills a gap by providing quantitative evidence from Khyber Pakhtunkhwa. The high diabetes-related amputation rate reflects the national diabetes epidemic. [25] The findings indicate that the most vulnerable, less-educated rural populations are bearing the brunt of amputations. This study is one of the first from a rural, conflict-affected region. KP has faced decades of militancy, displacement, and natural disasters, leading to a high burden of traumatic amputations and disease-related diabetic amputations as well. This research directly supports several Sustainable Development Goals (SDGs), such as SDG 3 (Good Health and Well-being): Target 3.8 on universal health coverage. Findings highlight the urgent need for integrated pain management, prosthetic services, and rehabilitation as part of essential health packages in rural Pakistan. The SDG 1 (No Poverty): Income significantly correlated with QoL. Amputees in poverty face a vicious cycle: disability reduces earning capacity, poverty limits prosthetic access, and poor mobility deepens poverty. SDG 10 (Reduced Inequalities): The age, income, and pain disparities show that older, poorer, and rural amputees are left behind. Policies must target these groups. SDG 11 (Sustainable Cities and Communities): Lack of accessible infrastructure (roads, doorways, public transport) limits physical activity. Rural communities need disability-inclusive planning.

The current study recommends that hospitals in KP should establish monthly amputee clinics offering pain assessment, prosthetic fit checks, and physiotherapy. Provincial health insurance (Sehat Sahulat Program) should cover modular prosthetics and travel costs to rehabilitation centres, which has been adopted in some centres, and its effectiveness should be researched. Train Lady Health Workers (LHWs) should be trained and involved to screen for phantom limb pain and refer for low-cost medications or to healthcare professionals accessible. Given the older age of most participants, it is necessary to develop home-based rehabilitation programs for elderly amputees who cannot travel to DHQ hospitals.

Recommendations for Mixed-methods research to explore why family support is poor despite cultural norms. Longitudinal studies should be carried out for tracking QoL before and after prosthetic provision.

This study has several limitations that must be acknowledged, as it was a Single-centre design: Data were collected from one DHQ hospital in rural Khyber Pakhtunkhwa, limiting generalizability to urban centres, private facilities, or other provinces. Being the cross-sectional study design, causal relationships cannot be inferred (e.g., low physical activity may cause low QoL, or low QoL may reduce motivation for activity). The sample size of sixty participants was too small for Subgroup analyses and stratification. Participants were selected with a non-probability purposive sampling technique, selecting those who returned to the hospital for follow-up, potentially overrepresenting those with better access or more severe problems. Despite these

limitations, the study provides valuable real-world data from an understudied rural LMIC population.

Conclusion

This study concludes that lower-limb amputees in rural Khyber Pakhtunkhwa, Pakistan, experience predominantly moderate-to-low quality of life, with severe pain, older age, low income, and reduced physical activity being the strongest modifiable determinants. Gender and marital status do not significantly influence QoL in this context. The findings underscore an urgent need for integrated pain management, subsidised prosthetics, and community-based physical activity programs at district-level hospitals. Without targeted policies aligned with SDG 3 and SDG 10, rural amputees will remain trapped in a cycle of disability, poverty, and poor well-being. Future, larger-scale, longitudinal research is essential to guide rehabilitation services in Pakistan's most marginalised regions.

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