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Health Related Quality of Life and Prosthetic Satisfaction in Unilateral Knee Amputated Patients: A Systematic Review

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ABSTRACT

Background and Purpose: Given the extensive literature on Quality of Life and Prosthetic Satisfaction in Unilateral Knee Amputated Patients above 14 years of age, a systematic review was undertaken to explore the satisfaction with the use of prosthetics, motor abilities, and socioacceptance status. A secondary goal was to ascertain whether prostheses help the patient's mobility and rehabilitation goals or not.

Methods: The database search included Google Scholar, Pubmed, and Elsevier from January 1, 2002, until August 31, 2022, for all articles included prosthetic satisfaction, amputation, and quality of life with prosthesis were included. 18 of the 1174 unique articles we found satisfied all inclusion requirements.

Results: In individuals with an unilateral knee amputation, the effectiveness of prosthetic satisfaction has been well shown. Even though many studies remark favorable, although little impact, there is evidence supporting the efficacy of or usefulness of prosthesis in amputated patients for increasing the quality of life and self-reliance in daily activities in people with one single lower leg.

Discussion and Conclusion: QoL is correlated favorably with prosthesis satisfaction. The majority of amputees looked to be happy with how well they performed overall. This indicates that prostheses are an important tool for amputees when selecting mobility aids.

1. INTRODUCTION

A terrible occurrence is losing a limb. The functional, social, and psychological facets of an amputee's life are altered as a result of this life-saving treatment.[1] Prostheses are frequently used by people who have lost a limb (acquired amputation) or are missing a limb (congenital deficit) to provide functionality and aesthetics to an anatomical limb. The use of prostheses as part of the rehabilitation process is advocated for those who have acquired amputations and those with those who have acquired amputations, and those who have a congenital loss of limbs.[2] Amputation affects a person permanently and has negative social, psychological, and functional effects that reduce their quality of life. Loss has an effect that goes beyond the sufferer and changes how families connect.[3] Over 65% of those who have lost a limb are lower limb amputees. It has been reported that the prevalence of specific illnesses that force limb amputation varies among various groups. Vascular disease is the main reason for peripheral amputations in affluent countries, whereas trauma, infection, uncontrolled diabetes mellitus, and malignant tumors are the main

reasons for amputations in impoverished countries.[4]

Most amputees in affluent countries are older adults with vascular problems. The majority of amputees in developing countries are, however, young, and the primary factor in limb amputations varies from hospital to hospital. Amputation results in a threefold loss of function, sensation, and body image, in addition to the loss of an anatomical limb. A prosthesis, a wheelchair, or a walking aid may be needed for those with LLA to order to walk. Despite all the challenges that come with LLA, some people manage to keep their independence in day-to-day activities by using their prostheses.[5] A person's inability to walk independently may affect their capacity to engage in social activities and reintegrate. Between 50 and 80 percent of amputees claim to often experience phantom pain.[6] Enhancing function and quality of life is the goal of prosthetic rehabilitation. Over the past 10 years, prosthetic technology has evolved tremendously.[2] They use prostheses to enhance the appearance or functionality of an artificial limb. Many medical professionals recommend using prostheses as part of the rehabilitation process for those who have congenital limb loss or acquired amputations. Contemporary prostheses' increased comfort, comfortability, and socket safety. However, some persons with LLA experience challenges with their health and degree of enjoyment while wearing a prosthesis, which can force them to reject or give up the item.[7] However, some persons with LLA experience challenges with their health and degree of enjoyment while wearing a prosthesis, which can force them to reject or give up the item.[7] In addition to prosthetic rehabilitation, amputees need a program to help them restore their social psychological, functional, and occupational well-being.[8] However, some persons with LLA experience challenges with their health and degree of enjoyment while wearing a prosthesis, which can force them to reject or give up the item.[7] In addition to prosthetic rehabilitation, amputees need a program to help them restore their social, psychological, functional, and occupational well-being.[8] Satisfaction is crucial in promoting the continuous age of mobility aids. In comparison to low-income countries, high-income countries report better levels of satisfaction with the use of mobility aids. User satisfaction is influenced by a variety of factors, including the device's ease of use, elegant design, and comfort and safety features. Therefore, it is crucial to verify whether or not function for daily living tasks is affected by the level of enjoyment with the usage of mobility aids.[9]

The relationship between an amputee's social area score and total QOL score is quite good. People with fulfilling social lives and satisfying relationships with their spouses, families, and friends have mental harmony because they benefit from support from family, friends, and society in the forms of emotional, financial, and social support, which lessens depressive thoughts and is negatively correlated with the physical aspect of QOL, improving overall QOL scores. Social support recipients were reported to have improved activity status, a higher quality of life (QOL), and more dignity. Therefore, to order to give amputees comprehensive therapy, it is vital to comprehend both physical and mental health. Given the significant negative link, lower limb amputees must prioritize psychological assessment and mental therapy.[8] As a consequence, their sense of self will grow, which might improve their quality of life. The in-patient rehabilitation program needs to prioritize a practical and comprehensive plan for home evaluations and adaptations, wheelchair mobility, in addition to an improvement in upper-limb functions, an increase in exercise tolerance, and walking training.[19] The success of a prosthetic rehabilitation program is likely to be influenced favorably by several factors, including excellent stump quality, a history of successful use of a prosthesis following initial amputation, the absence of any significant locomotor and cognitive issues, and good motivation.[10] Recreational pursuits, sports, economic opportunities, or re-entry into the educational system should all be a part of the community reintegration process. A successful rehabilitation program for someone who has lost a limb must include these components. With an experienced staff, it might be easier to achieve a good integration and return the patient to their highest functional level.[1] In the national context, these patients' rehabilitation has advanced recently, mostly as a result of interdisciplinary treatments and legal assistance from the public health system. However, there are still issues to be resolved, including socioeconomic challenges that result in the abandonment of the prosthesis

and the failure of rehabilitation, as well as delays in referral to begin proper therapy and inclusion in rehabilitation programs.[6]

Eligibility

Inclusion and exclusion criteria

Only prospective, controlled, or uncontrolled intervention trials that have been published in scholarly publications were included in the review. This review excludes retrospective study designs, case reports, case series, comments, letters to the editor, and professional views. There were no linguistic limitations in this evaluation. Studies are required to look at a group of individuals with amputation, their psychological effects, prosthetic satisfaction their quality of life after prosthetic use in order to be considered eligible.

As previously mentioned, the search intended to include all studies that examined outcomes of patient quality of life and prosthetic satisfaction, either independently or together. We made the decision to leave trials where other variables were provided or allowed at the same time in places. The review was limited to those studies that focused on patient self-esteem, mobility, and socio-acceptance, as well as prosthetic satisfaction and life after prosthesis. Studies that don't show relation between amputation, satisfaction, and quality of life with a prosthesis, etc., were excluded. After screening the titles and abstracts, we didn't include records of case studies in progress trials, retrospective studies, non-English language publications, and completely irrelevant articles.

The population of interest was people above 14 years of age who had, undergone unilateral below knee amputation.

Studies published in peer-reviewed publications with complete texts accessible in English were the only studies included in the review. Regardless of the study's design, all research papers were approved. Studies that were only published in abstract or dissertation form were not included.

Search Strategy

We carried out a thorough, systematic literature search to find all pertinent English papers using the following databases: Google Scholar, Pubmed, and Elsevier with filters to search articles as English articles covering the time span from January 1, 2002, until August 31, 2022. we chose 2002 as the lower cut-off since the prosthetic wasn't that advance earlier.
The strategy listed below was taken:

- Prosthetic satisfaction,
- amputation,
- quality of life with a prosthesis
- mobility with prosthesis
- mobility after amputation
- QOL after amputation

Each author separately evaluated each title and abstract to see if inclusion requirements would have been satisfied. The two writers' selection findings were compared, and disagreements were settled through discussion. None needed the involvement of a third reviewer in order to be decided. After removing duplicate entries using this approach, we discovered 1192 records from the searches. There were no further records from other sources found. We eliminated 1174 entries after skimming the titles and abstracts for case studies in ongoing trials, retrospective research, publications in other languages, and papers that were wholly unrelated. A total of 18 papers were determined to fulfill here view inclusion criteria after additional evaluation.

Figure 1. Prisma Flow Diagram -Search Strategy and Retrieval OF ARTICLES.

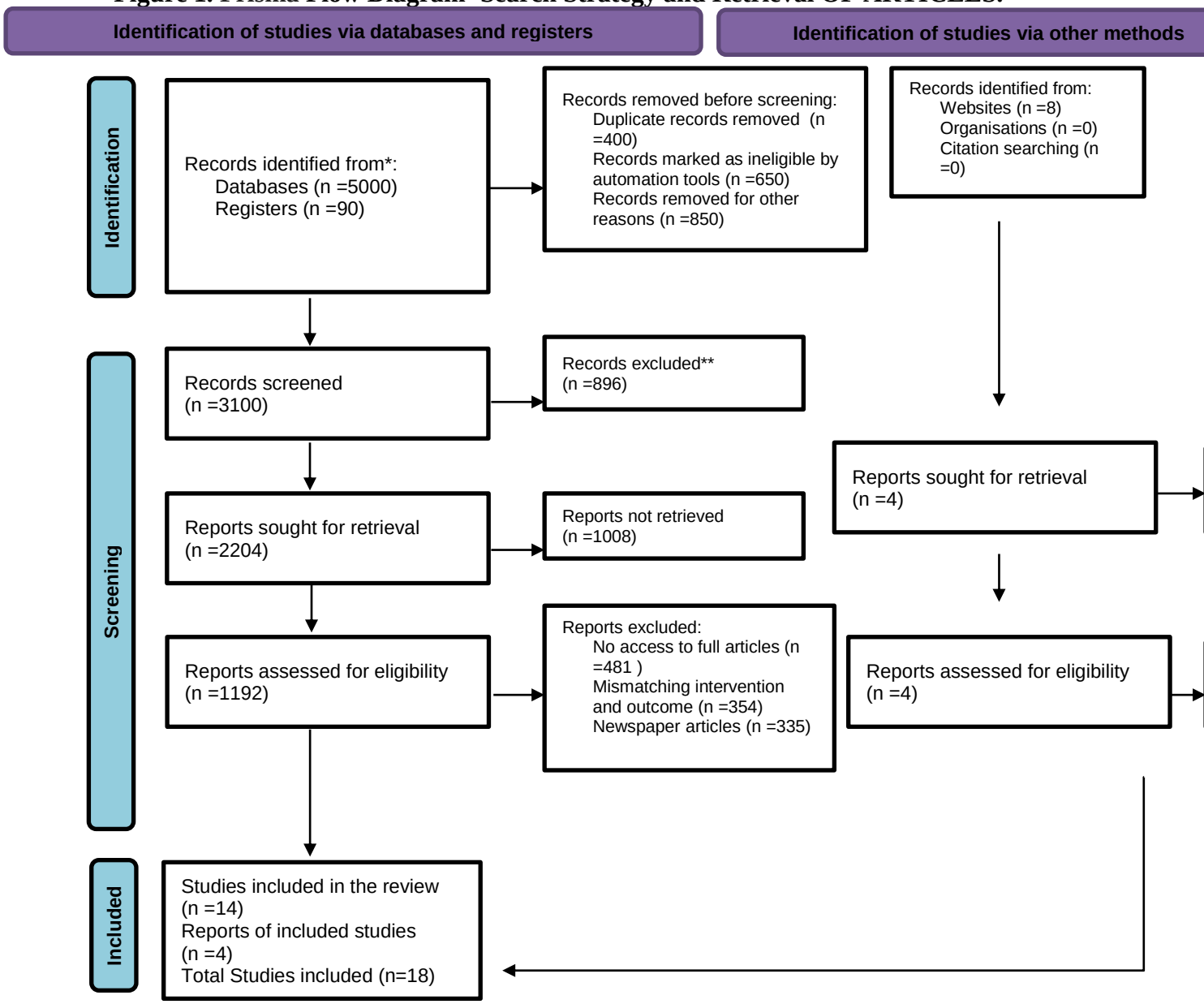

Table: 2 Depicts The Result Evidence And Strategies.

AUTHOR/ YEAR	TYPE OF STUDY	AIM OF STUDY	PARTICIPANTS	OUTCOME MEASURES	RESULT
Eskridge et al. (2022)	Cross-Sectional Study	To evaluate the QOL Prosthesis satisfaction among US military personnel veterans lower-limb amputations due to conflict.	86 volunteers in the Wounded Warrior Recovery Project who have Substantial lower limb amputations as a result of combat.	Subjects filled out the Orthotics Prosthetics Users' Survey (OPUS)Quality of Well-Being Scale and Device Satisfaction Scale.	In a linear regression analysis, the Quality of Well-Being Scale, Self-Administered score, was positively related to the overall OPUS Satisfaction with Device score(=0.0058; P=0.004).
Farah	Cross-Sectional Study	To investigate the relationship between prosthesis satisfaction, body image perception,	After receiving approval from the University of Lahore's IRB, the study, including 63 participants, was carried out. Males and female amputees between the ages of 18 and 60 were included.	TAPES, the Amputee Body Image Scale, and the Amputee Mobility Predictor Assessment Scale were used to collect data.	The findings revealed a direct correlation between contentment level and mobility, although an inverse correlation between disturbance of the body image and mobility and satisfaction level was seen(P0.05).

Nurulizzatie Yunos.et.al. (2022)	Cross-Sectional Study	The purpose of this study is to evaluate amputees in Bangi, Selangor's aids dependence daily activities.	The information was gathered from 55 lower-limb amputees at Pusat Latihan Perindustrian dan Pemulihan (PLPP), Bangiin Selangor, Malaysia.	Barthel Index and the Quebec User Evaluation Satisfaction with Assistive Technology (QUEST 2.0)(BI). They were combined to assess the level of satisfaction with the assistive devices utilized depend on Encino's daily life activities.	The findings revealed no connection between the use of mobility aids and level of happiness; nevertheless, users who utilized cast prostheses as mobility aids felt more dependent on their prostheses to carry out everyday tasks.
Anna Zaheeret .al.(2020)	Cross-sectional study	To assess the amount of depression and quality of life among lower limb amputees who had a Transtibial or transfemoral amputation. Moreover, to Determine the relationship between amputees' QOL and Depression levels.	70 lower limb amputees, both male and female took part in this study.	PHQ-9 WHOQOL-BREF Questionnaires are used to determine the severity depression utilized a questionnaire.	Depression and QOL scores were found to have a strong negative association. Response rate (-0.615, p=0.000). Social QOL was strongly correlated with linked(0.808,p=0.000)with the amputees' overall QOL score.

Anna Zaheeret. al. (2021)	RCT	The current study's goal is to assess Phantom limb pain, mobility, and quality of life.	24 unilateral lower limb amputees (above and below the knee) were randomly divided into two equal groups: Which received mirror therapy.	Utilizing questionnaires from the VAS (pain), AMP(mobility), Version 1.0 (QOL), data were gathered at baseline, 2 and 4 weeks following the intervention. With a 95% confidence interval, IBMSPSS 25.0 was used for all statistical analyses.	The individuals' average ages in the experimental and control groups were 45.3,11.1 and 40.5 12.5 years, respectively. The experimental group's pain level (VAS score) was considerably lower after the Intervention (p=0.003). The experimental group also scored significantly higher on the SF-36 in the "bodily pain" domain (p = 0.012). There were no significant(p>0.05)between-group differences, and both groups significantly(p0.05)improved in other SF-36 areas And ambulatory potential.
Yasir Demiret. al. (2019)	Descrip-tive Study	The current study set out to assess patients with lower limb amputations due to combat patients' prosthesis use, satisfaction with their prosthesis-reported issues, and quality of life.	A total of 30 patients with 35 amputations were included. frequency, daily total prosthetic	Using a quantitative scale, satisfaction with the prosthetic device was evaluated(0 to 10). Short-Form Health Survey was used to evaluate quality of life(SF-36).	Itching, pain, and wound were all strongly connected with satisfaction level (r: -0.491, -0.528, and-0.480, With respect to the mean level of prosthesis satisfaction).

			wearing satisfaction to the amputation.		
Richa Sinhaet.al. (2011)	cross-sectional study	The purpose of this study is to examine the relationship between quality of life (QoL) adjustments following amputation and artificial limb use, as well as the effects of socio-demographic, medical, and amputation-related factors on this association.	Structured questionnaires were used to interview patients (n=368) who Non congenital lower amputations	Adjustments Amputation and prosthetic limb were evaluated using the Trinity Amputation and Prosthesis Experience Scales (TAPES), and the MOS Short-Form Health Survey (SF-36) was used to evaluate the physical (PCS) and mental (MCS) components summaries of QoL.	The most Significant influences on QoL were found to be a functional restriction, adjustment Limitation, and social adjustment, whereas functional satisfaction, social restriction, and to a much lesser extent, athletic activity restriction had an impact on QoL. However, their study did not find that comorbidity. Had an impact on any aspect of QoL.

C.D.Murray (2002)	A Survey-based study	The purpose of this study is to investigate the gender differences in prosthesis satisfaction and body image among users of lower limb prostheses.	An online	Spearman, The Rho correlations for these three domains were determined.	Body image problems and prosthesis satisfaction were found to have moderate to strong unfavorable relationships.

Level and quality of evidence supporting prosthetic satisfaction and quality of life in amputees

Prosthetic Satisfaction and Quality of life		PEDro Item Scoring											Scoring
Author	Sackett Level of Evidence	1	2	3	4	5	6	7	8	9	10	11	PEDro Total Score
Eskridge Et.Al (2022)	IV	1			1				1	1	1	1	5
Farah Javaidet.al(2022)	IV	1		1	1				1	1	1	1	6
Nurulizzatie Yunos et.al.(2022)	IV	1		1	1			1	1	1	1	1	8
YasinDemiret.al. (2019)	IV	1		1	1			1	1	1	1	1	8
Anna Zaheer et.al.(2020)	I	1	1	1	1	1	1	1	1	1	1	1	10
RichaSinha et.al.(2011)	IV	1		1	1				1	1	1	1	6
C.D.Murray et.al.(2002)	II	1								1	1	1	3

Carolyn et.al.(2009)	II	1							1			1	2
Liliana E.Pezzin et.al.(2004)	III	1	1	1					1	1		1	5
Anna Grzebień et.al.(2017)	III								1	1	1	1	4
Et.Muhammad Mahdi AbdulRazak et.al.	II	1	1	1	1	1	1	1	1	1	1	1	10

(2016)												
D.Matos et.al.(2020)	II	1			1			1	1		1	4
P. Calmels et.al.(2002)	II	1			1			1	1	1	1	5
Yesim Akyol et.al.(2013)	III	1		1	1			1	1	1	1	6
A. De Fretes et.al.(1994)	III	1	1	1	1	1	1	1	1	1	1	10
RichaSinha et.al.(2014)	II	1			1				1	1	1	4
Lukas A.Holzer et.al.(2014)	II	1	1	1	1	1	1	1	1	1	1	10
Anna Zaheer et.al.(2021)	I	1	1	1	1	1	1	1	1	1	1	10

Sackett's Levels of Evidence

Level	InterventionStudies
I	A systematic review of randomized, controlled trials (RCTs) Large RCT with narrow confidence interval (n_100)
II	Smaller RCTs (n_100) Systematic Reviews of cohort studies Very large ecological studies

III	Cohort studies (must have concurrent control group) Systematic Reviews of case control studies
IV	Case series Cohort studies without concurrent control groups Case-control study
V	Expert opinion Case study Bench research Expert opinion based on theory or physiological research Common sense anecdotes

2. RESULT

Eskridge et al. (2022) concluded in their results that the majority of participants were content with their prosthesis' general functionality, but they weren't happy with how it affected their skin and clothes, as well as the costs associated with their prosthesis. In addition, satisfaction with the prosthesis was positively associated with quality of life.[12] Whereas, **Farah Javaid et al. (2022)** stated that perceptions of body image, mobility, and satisfaction with the prosthesis are correlated in lower extremity amputees wearing a prosthesis.[13] However, **Nurulizzatie Yunos et al. (2022)** show that however, users who employed cast prostheses as mobility aids discovered that prostheses gave them more reliance when completing everyday tasks. The mobility aids used were shown to have no significant connection with the level of pleasure. Prothesis was determined to be the most convenient mobility device; however, consumers did not feel that it could satisfy them.[14] A RCT by **Anna Zaheer et al.(2021)** Researchers came to the conclusion that adding phantom activities to lower limb amputees receiving mirror treatment and regular physiotherapy for four weeks significantly improved pain management. However, neither the ambulatory potential nor the majority of the quality-of-life of life areas showed any further effects from these workouts.[8] Moreover, **Anna Zaheer et al. (2020)** Amputees participating in this research underwent severe life changes that had a detrimental effect on their quality of life in all respects. The depressive symptoms among the subjects were mild to severe. There was a strong positive correlation between the social domain score and the amputee's overall core quality of life. Amputee's quality of life and depression scores were negatively correlated. [15] **Yasin Demir et al. (2019)** study found that satisfaction with the prosthesis has a significant impact on service life. Esthetic anxiety, itching, pain, and injury correlated significantly with the daily wear time of the prosthesis. Despite its limitations, the current study's findings may help with the creation of future prostheses.[16] **Richa Sinha et.al. (2011)** found in their study that prosthesis use and co-morbidity were the most important factors affecting the physical health component of quality of life. Lower extremity amputees reported poorer quality of life compared to the general population. The primary conclusions of this study were the significance of work status and the usage of assistive technologies in influencing the quality of life. Other significant variables that have been identified to impact quality of life include the usage of prostheses, co-morbidities, phantom limb pain, and residual limb pain.[17] **C.D. Murray(2002),** while researching, found that the close relationship

between body image and prosthesis satisfaction among prosthetic leg users is instructive, as a retenders differences in these relationships. These findings, such as the greater importance of the aesthetic components of a prosthesis in women and the functional aspects in men, have implications for the delivery of specific services in prosthetic rehabilitation.[2] Most amputees appeared to be satisfied with the overall performance of their prosthesis, and few patients were not satisfied with their prosthesis. It might be said that patients were generally happy with their lower limb prostheses. Amputation patients' quality of life was correlated with prosthetic mobility, depressive symptoms, social support, co-morbidities, regular social activities, prosthetic issues, and age. The contributing elements must be considered since they almost certainly will have a beneficial impact on life quality in terms of health.[2]

3. DISCUSSION

The majority of participants, according to the results, were content with their prosthesis' general functionality, but they were not happy with how their prosthesis affected their skin and clothes or with the costs associated with it. Additionally, QOL and prosthesis satisfaction were strongly correlated.[12] According to some studies, an amputee may also experience psychological problems such as depression and low self-esteem due to a variety of factors, such as a change in how they perceive their bodies, in addition to the change in mobility brought on by a prosthesis and the corresponding prosthesis satisfaction.[18] A person's decision on the sort of mobility equipment to employ may also be influenced by financial considerations. The respondent was happy with the mobility assistance because it was more affordable for them. Furthermore, the majority of respondents said they had only used mobility aids for up to five years. Consideration of the cost issue could influence how satisfied they reported being. Assistive technology also includes mobility aids like wheelchairs and prosthetic limbs. These mobility aids cost more than canes and other cane-like aids that don't use technology. Thus, this might be the reason why the responder expressed the greatest degree of happiness when utilizing axillary crutches, despite their belief that prosthetics could increase reliance.[20] Problems with service, upkeep, and repairs would be a big source of discontent. The company that helps persons with impairments move about has a limited budget to guarantee that technological assistive devices are accessible. They must wait a long time to receive help, which might lead to increased dependence.[14] Additionally, lower limb amputees' quality of life is often reduced as a result of their impairment. Both the sense of body image and PLP affect how well amputees function physically, psychologically, and in terms of quality of life. Results indicated benefits across the board for quality of life. Regular physical treatment, which includes static, dynamic, prosthesis, and gait training, might be blamed for these changes, stretching, strengthening, and other activities that may promote metabolism and wound healing.[8] There may be a connection between the mental and physical facets of life quality, according to a recent study. Postoperative discomfort, physical pain, and lingering or phantom limb pain all have a favorable correlation with anxiety. Between the social area score and the overall QOL score of amputees, there was a considerable positive link. Because they receive support from their families and society in the form of emotional support, financial support, and social support, people who have a fulfilling social life and are satisfied with their relationships with their spouses, families, and friends experience mental harmony. Because depression is negatively correlated with the physical aspects of QOL, this improves overall QOL scores.[15] The mental aspect of QoL was more substantially impacted by social adjustment than the physical aspect. The psychological and social

domain of WHO-QoL was also shown to be significantly and favorably associated with it. It was not connected to the physical domain of WHO QoL; on the other hand, although it was discovered in research to be connected to the physical domain of QoL, which is a novel discovery. The social adjustment scale, often known
as TAPES, really measures how comfortable people feel in their new social situations after amputation in relation to their amputated limbs. According to research, those who have a favorable body image are more likely to be psychologically well after having an amputation. Co-morbidity is the second most important factor in determining the quality of life, behind aspects relating to amputation adjustment and prosthetics. Functional restriction, coping with limitations, and social adjustment were shown to have the greatest effects on quality of life (QoL); despite the fact that social isolation, functional satisfaction, and to a much lesser extent, physical activity limitation had an influence.[11]

4. CONCLUSION

QoL was correlated favorably with prosthesis satisfaction. More so than the physical component, a social adjustment had an impact on the mental aspect of quality of life. Few patients did not appear to be delighted with their prosthesis, and the majority of amputees looked to be happy with how well it performed overall.
This indicates that prostheses are an important tool for amputees when selecting mobility aids.

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