The comparison of psychological and social adaptation below elbow amputation men using a mechanical and myoelectric prosthesis by using of TAPES questionnaire

mA. Keyvani Hafshejani[1], M. Javanshir[2], M. Kamali[2], MS. Ghasemi[2], M. Emami[3], S.A. Esmaeeli[1], A. Langari[4], M. Sattari Naeini[5*]

1- Shahrekord University of Medical Sciences, Shahrekord, Iran
2- Faculty of Rehabilitation, Tehran University of Medical Sciences, Tehran, Iran
3- Markaz Roshd, University of Shahrekord, Shahrekord, Iran
4- North Khorasan University of Medical Sciences, Bojnurd, Iran
5-Naein Branch, Islamic Azad University, Naein, Iran
E-Mail: Sattari@gmail.com

Abstract: Design and manufacturing of the Myoelecterical prosthesis in compared to Mechanical prosthesis must also effectively, smart, light, strong and permanence. It is time consuming and expensive that ultimately leads to significant increases in the price of Myoelecterical prosthesis. Therefore, considering the high cost of these prostheses, hence, assessment of psychological and social adaptation between two groups must be clear and explicit. In this regards, present study was conducted on this topic. In this descriptive cross-sectional analytical study, two groups compared to each other from quality of life, participants was two groups of 20 below elbow amputation veterans that use from Mechanical or Myoelectrical prosthesis that refer to central technical orthopedic Kosar. For gathering the data we use TPEAS questionnaire. This questionnaire evaluates participants from 3 items: psychosocial adaptation, functional limitation and satisfaction of life .For data analysis use to t independent and ANOVA test. This research showed that there are significant differentiations in psychosocial adaptation between two groups. The findings identified that Myoelecterical group higher psychosocial and social adaptation in compare to Mechanical group. So that the hypothesis of this research in terms of higher psychological and social adaptation in the Myoelecterical group was accepted.
[Keyvani Hafshejani mA, Javanshir M, Kamali M., Ghasemi MS, Emami M, Esmaeeli SA, Langari A., Sattari Naeini M. **The comparison of psychological and social adaptation below elbow amputation men using a mechanical and myoelectric prosthesis by using of TAPES questionnaire**. *Life Sci J* 2012;9(4):5583-5587] (ISSN:1097-8135). http://www.lifesciencesite.com. 829

Keywords: TPEAS questionnaire, Myoelectrical prosthesis, Mechanical prosthesis, psychological and social adaptation

1. Introduction:

Throughout the history, enduring failure is usually equal to amputation (Jhon *et al.*, 1992). There are 1700000 amputations people who live in the United States of America and 185,000 people yearly are discharged from the hospital with amputation (Edeer 2011).

Several factors such as trauma, infection, tumors, vascular disease, accidents, infectious diseases, and so create an amputation. Yet a high percentage of amputation statistics are in countries at war. so the 68/8% of statistics amputation is due to trauma in the above organ pipe (Jhon *et al.*, 1992; Gerzeli *et al.*, 2008; Atkins *et al.*, 1996). Although recent improvements of human science improve the quality prosthetics and prosthetic limbs but it is costly (Gerzeli *et al.*, 2008; Kahle *et al.*, 2008; Brodkorb *et al.*, 2008).

A person with an amputation is met with a sharp decline in the ability to fulfill his/her activities. In general, a variety of upper limb prostheses are designed and used. They can be split based on kinetic mechanisms of mechanical prostheses, Beauty (cosmetic) and myoelectric.

The researches which compare mechanical prostheses and myoelectric show that myoelectric Prosthetics are more acceptable because of the more power of grip, no need to the total bandage system and increasing the personal ability (Weaver *et al.*, 1988).

Unfortunately, despite the efforts that have been made in the field of prostheses performance, the ability of individuals to use them is not so well and some people do not prefer to use any type of prosthesis (Jhon *et al.*, 1992; Atkins *et al.*, 1996; Biddiss *et al.*, 1988; Mazet *et al.*, 1956).

A very important point that should be considered is that the rehabilitation of the upper limb amputation should be done as a team, in which the Constructive prosthesis is considered as one of the team members (Weaver *et al.*, 1988; Durance and shea, 1998). Despite significant improvement in the area of prosthetic parts with high performance and high aesthetic, patient satisfaction has not improved significantly. Specifically many of the above-limb amputees, straw or prefer not to use prosthesis or use the cosmetic prostheses. Identify factors affecting performance of the upper limb prostheses and evaluation of individual skills in the use of dental prosthesis is very important (Weaver *et al.*, 1988; Durance and shea, 1998).

Despite the importance of identifying factors that affect the performance of prostheses, few studies have been done in this area and researches have shown conflicting results. Roeschelin and Domholdt (1989) found that factors such as age, lack of a dominant hand, the lack of elbow and learning how to use a prosthetic implant have not a considerable effect on the performance of prosthetic (Roeschelin and Domholdt, 1989).

However Bourough and Book (1991) in their study concluded that a personal training in the use of prosthetic have significant impact on the success and performance of the prosthesis. Studies have shown that people with different levels of amputation of both physical and mental performance, social must be able to adapt to new conditions. In the past, the more physical aspects generally considered, but recently the psychological variables, is more social. Fewer studies have been done in relation to quality of life and there is little literature about quality of life and none have worked exclusively on this issue (Gallgher and Maclachan, 2004). Thus, to obtain valuable results reveal that the policy prescription, buy and the standard implant should be install, classical studies in higher education and research is done.

The aim of this study is to compare quality of individual life of two group which used mechanical and Myoelectric and for this purpose we used TAPES questionnaire.

Seems to be largely a function of the quality of life in people with amputations easily, improving mental and emotional satisfaction in using the prosthesis, artificial performance seems directly related to the quality of life, so it was researchers to assess quality of life between the two groups amputation using simple mechanical joint myoelectric and amputee veterans with equal sample size for orthopedic services Technical Orthopedics Orthotics & Prosthetics Center will visit Tehran Kowsar, TAPES questionnaire to assess quality of life, and then compare the data of two groups.

2. Method

A descriptive cross-sectional study is to compare functional limitation for veterans with unilateral below elbow amputees using two mechanical prostheses and myoelectric unilateral below elbow amputee veterans of our study population center in Tehran Orthotics & Prosthetics Kosar Foundation, formed in 2011.

The plan approved by the Research Council of Tehran University of Medical Sciences Faculty of Rehabilitation offers a referral center providing comments and cooperation Kosar Center officials. All files honored war veterans with amputations below the elbow will get away from the Archive Center. Following hospital records, using the criteria for inclusion and exclusion criteria were not sampled cases that were excluded.

That in each case was given a code number using four wood samples and 40 samples were selected randomly, then, 40 people were randomly divided into two equal groups of 20 which used their current prosthesis last six months.These people have no underlying problems, including heart disease - cardiovascular, diabetes, chemical injury, severe orthopedic conditions such as fractures and bone infections of the upper limb, blindness, lower limb amputation, and physiological illness. they were invited to Kosar center to provide for the orthotics and prosthetics was constructed.

The program participants were invited to the orthoses and prostheses Kosar center and after examination, interview and re-sample matching criteria TAPES questionnaire will be provided. Participants completed questionnaires and returned it. TAPES questionnaire is designed and introduced for the first time in 1999 by Gallagher and Maclachan and used in order to improve the knowledge of prosthesis about individual compliance and improving the services (Gallgher and Maclachan, 2004). The validity and reliability of questionnaire are examined in Iran in 2008 in the satisfactory condition (Fardipoor, 2008).

According to a study that has examined the reliability and validity of the questionnaire to assess quality of life of people with upper limb amputations addressed, the research team in order to examine the validity of the questionnaire, the questionnaire was given to 10 academic experts people, and to their views and corrective actions have been considered.

The reliability of the questionnaire was assessed using Cronbach's alpha coefficient for the overall reliability of the questions related to compliance, social compliance, compliance with limits, exercise limits, functional limitations, social limitations, aesthetic satisfaction, satisfaction, satisfaction with weight and yield Respectively 81%, 78%, 73%, 71%, 75%, 72%, 71%, 77%, 70%, respectively.

Desmond and Maclachan (2005) to assess the validity and reliability TAPES questionnaire, have used TAPES in a study to assess the scale factors for upper extremity amputees.

This study was conducted on 100 men with upper limb amputation, the findings suggest that there is good reliability and validity in 9 subscales of TAPES questionnaire to assess quality of life was amputation of the upper limb (Desmond and Maclachlan, 2005).

Its sections are:

The first part is personal information, the second part consists of three main questions, psychosocial adjustment, activity restriction and satisfaction with the prosthesis, the last sub-section

is satisfactory prosthesis The three categories of aesthetic satisfaction, satisfaction, satisfaction with weight and performance are the limitations of activity limitation exercise, functional limitations, and social limitations to bring a rubber The other part to questions about the amount of pain that a person is a member of cut, phantom pain, feeling healthy individuals to own and use average pay.

For data analysis software SPSS version 17 was used to mash Excel., In this study using techniques based on a comparison of independent variables (mechanical and Myoelectric)

Calculate the mean of the dependent variable (compliance, restrictions, satisfaction, performance, style, ...) will draw the necessary tables and then compare the averages and the difference paid to the analysis of data. Methods and

1- Descriptive statistics including: mean, standard deviation

2 - T-test and ANOVA test data used

Obtaining informed consent from all patients, respecting ethical considerations and the principle of secrecy and pledged that there was no risk of physical or mental

3. Results:

In the user of mechanical prosthetic group, age over 45 years class, with a 60% was the largest group. The maximum time for amputation was 15 to 25 years with 65%, which 60 percent of those 15 to 25 years used their prosthesis and 40% used the prosthesis for 5 to 10.

In the Myoelectric group 65 percent of people was 45 years old which 47.4 percent of them passed 15 to 25 years of their member. 55% of those 15 to 25 years are using the prosthetic that 60 percent of them between 5 and 10 years passed of prosthesis.

In overall concordance section was found that the mean score on this item is lower in myoelectric group, its mean the mechanical prosthesis users more than myoelectric prosthesis users are accustomed with their prosthesis and they were able to cope with their problem. In terms of statistics, the T test statistic was calculated equal to (2.075) and the significance test (0/05> p), showed statistically significant differences between the two groups was generally consistent.

In social correspondence section was found that the mean of this items in the mechanical group was significantly higher than myoelectric its mean the social correspondence in the mechanical prosthesis users more than myoelectric prosthesis, averagely. T-statistics of the test were estimated equal to (1.515) and tests significance (0.138) show research hypotheses (0/05> p), was rejected in significant level.

In Compliance with the restrictions section was found that the mean of this item in the mechanical group was significantly higher than myoelectric. T-statistics of the test were estimated equal to (0.952) and tests significance (0.347) show research hypotheses (0/05> p), was rejected in significant level.

4. Discussion:

Today, despite the rapid pace of progress in science and technology, to build good-quality artificial are a major concern of researchers and amputees people. Amputation is a continued permanent defect that leads to impaired psychological and social adaptation and individual activities (Hsu and Michael 2008).

We have received Myoelectric prostheses with such features, enhanced functionality and use neural signals having the same motion, the faster and more powerful than mechanical prostheses aimed at improving psychological And function imposing great cost to the people using it, however, mechanical prosthesis lighter, less costly and easier to maintain than dentures with Myoelectric (Hsu and Michael 2008).

Match the size of the causes of these differences can be noted that the suspension and fitting the appropriate prosthesis needs to be very careful Myoelectric, Wearing dentures, and more accurately, and endured to become accustomed to accepting electronic patient wearing dentures, But since the use of a mechanical prosthesis fitting bandage needs to be careful not prosthetics (condyle, especially in the area of high-epididymides), So we can conclude with mechanical prostheses in terms of overall fitness and to get used to wearing dentures more comfortable With regard to the mechanical prosthesis compared Myoelectric heavier, and a mechanical prosthesis due to bandages and having more socket trim lines over time, more sick overall compliance with the prosthesis implant takes Myoelectric, so the results the not unexpected (Hsu and Michael 2008).

The social adaptation, because it seems kind of prosthesis (mechanical or Myoelectric) to influence the behavior and attitudes towards disabled people Mental issue is not a member of his artificial, the result obtained in this section can also confirms this. (HSU and Michael 2008).

Desmond and Maclachan (2002) stated that individuals with amputation due to lack of compliance with the new conditions, psychological problems, social as depression, feelings of hopelessness, low self-esteem, fatigue, anxiety and suicide are sometimes also involved other problems, including rough treatment (Materials and alcohol addiction), and social functions are weak. It also states that these people back to life after amputation is associated with many problems (Desmond and Maclachlan 2008).

Section where it appears to be consistent with the restrictions affect the mechanical

prosthesis increasing compliance with restrictions The activity social and psychological aspects are more confident that is not the results were not unexpected. (Hsu and Michael 2008).

Weaver and colleagues (1988) in a study of amputees who used a mechanical prosthesis, the prosthesis was Myoelectric, all participants agreed that their grip strength with mechanical prosthetic implant is better than Myoelectric.In this study, the subjects were asked to perform 38 different activities, which in all cases was improved mechanical strength of the implant. The most important reason for the lack of efficiency in denture Myoelectric cable system was described (Weaver et al 1988).

This is expressed in the limitations section of sport, the entire prosthesis having Myoelectric not mean that the person is unable to do any physical activity But compared to mechanical limitations in many cases due to better grip, more subtle, is faster and more powerful than, for example, someone in the group to remove the objects Myoelectric semi- Not restricted to tennis rackets and baseball, then the condition is true, the results are quite reasonable and not unexpected. (Desmond and Maclachlan, 2008).

Sarah et al (2008) in a study examining the relationship between physical activity and quality of life in people with lower limb amputations began, the results showed that the effect of physical activity in improving the quality of life of many lower limb amputations are. (Sarah *et al.*, 2008).

Table 1. The table of variables

MYOELECTRIC			MECHANICAL						
Standard deviation	Average	PERCENT	NUMBER	Standard deviation	Average	PERCENT	NUMBER	YEAR	
7/414	45/42	15	3	9/593	45/89	15	3	Below 35	AGE
		20	4			25	5	36-44	
		65	13			60	12	Above 45	
6/393	23/26	15/8	3	6/889	18/75	25	5	Below 15	Time of amputation
		47/4	10			65	13	15-25	
		36/8	7			10	2	Above25	
6/504	21/75	20	4	6/778	17/05	40	8	Below 15	Duration of implant
		55	11			60	12	15-25	
		25	5			-	-	Above 25	
6/353	9/6	15	3	7/087	9/7	25	5	Below5	Duration of current prosthetic
		60	12			40	8	5-10	
		25	5			35	7	Above 10	

Table 2. Descriptive and analytical statistics parameters of mechanical and myoelectric prosthetics group.

T	P value	MYOELECTRIC		MECHANIC		Variable
		S.D	AVERAGE	S.D	AVERAGE	
2/090	0/043	0/716	4/25	2/13	5/3	Social limitation

5. Conclusions:

In this study the quality of individual life of two groups which used mechanical and Myoelectric prosthesis was compared. The results of TAPES questionnaire and statistically analysis show that:

- Physiological and Social adaptation in men below elbow amputation that used myoelectric prosthesis higher than mechanical prosthesis.
- the mechanical prosthesis users more than myoelectric prosthesis users are accustomed with their prosthesis and they were able to cope with their problem.
- Mean of compliance with the restrictions in the mechanical group was significantly higher than myoelectric group.

Acknowledgements:

The author would like to thank vice head of research affairs of rehabilitation school, and officials and employees of Kosar rehabilitation center as well as the veteran's which participants in the study.

Corresponding Author:
Dr. M. Sattari Naeini
Naein Branch, Islamic Azad University, Naein, Iran
E-mail: Sattari@gmail.com

References

1. John H, Bowker John W, Michael ED, Louis ST. American Academy of Orthopedic Surgeons, Atlas of limb prosthetics: surgical, prosthetic, and rehabilitation. Principles. 2nd ed, London, Mosby Year Book, 1992.
2. Edeer D. Upper Limb Prostheses – A Review of the Literature with a Focus on Myoelectric Hands. February 2011. Available at: http://worksafebc.com/health_care_providers/ Assets/PDF/UpperLimbProstheses2011.pdf
3. Gerzeli S, Torbica A, Fattore G:Cost utility analysis of knee prosthesis with complete microprocessor control(C-Leg)compared with mechanical technology in trans-femoral amputees. European Journal of Health Economics 2009; 10(1):47-55.
4. Atkins DJ, Heard DCY, Donovan WH. Epidemiologic Overview of Individuals with Upper-Limb Loss and Their Reported Research Priorities. Journal of Prosthetics and Orthotics 1996,8(1):2-11.
5. Kahle JT, Highsmith MJ, Hubbard SL. Comparison of Non-microprocessor Knee Mechanism versus C-Leg on Prosthesis Evaluation Questionnaire, Stumbles, Falls, Walking Tests, Stair Descent, and Knee Preference. Journal of rehabilitation Research and development 2008; 45(1):1-14.
6. Brodkorb TH, Henniksson M, Johanneson-Munk K, Thidell F. Cost effectiveness of C-Leg compared with non-microprocessor-contrlledknees,a modeling approach. Archives Physical Medicine and Rehabilitation 2008; 89(1):24-30.
7. Weaver SA, Lange LR, Vogts VM. Comparison of myoelectric and conventional prostheses for adolescent amputees.Am J OccupTher 1988; 42(2):87-91.
8. Biddiss E, Chau T. Upper-limb prosthetics, critical factors in device abandonment. Am J Phys Med Rehabil 2007; 86(12):977-87.
9. Mazet R, Taylor CL, Bechtol CO. Upper extrimity amputation surgey and prosthesis prescription. Journal of Bone and Joint Surgery 1956;38:1185-98 .
10. Durance JP, O'Shea BJ. Upper-limb amputees: a clinical profile, a clinical profile. Inter Disab Stud 1998;10(2):68-72.
11. Roeschlein RA, Domholdt E. Factors related to successful upper extremity prosthetic use. ProsthetOrthotInt 1989;13(1):14-18.
12. Burrough SF. Patterns of acceptance and rejection of the upper-limb prosthesis. Journal of Prosthetics and Orthotics 1991;39(2):40-47.
13. Gallgher P, Maclachan M. The Trinity Amputation and Prosthesis Experience Scales and quality of life in people with lower – limb amputation. Arch Phys Med Rehabil 2004; 85:730-736.
14. Fardipoor SH, Salavati M, Mazaheri M, Bahramizadeh M. crosscultural adaptation and Validation of Trinity Amputation and Prosthesis Experience Scales (TAPES) in Iranians with lower limb amputatation. 1387
15. Desmond DM, Maclachlan M. Factor structure of the Trinity Amputation and Prosthesis Experience Scales (TAPES)with individuals with acquired upper limb amputation. Am J Phys Med Rehabil 2005; 84(7):506-13.
16. Hsu J, Michael JW, Fisk JR. AAOS Atlas Of Orthoses and Assistive Devices 2008;4(5):113-117.
17. Desmond D, Maclachlan M. Psychological issues in Prosthetic and orthotic practice,a 25 year review of osychology in Prosthetics and Orthotics International. Prosthet Orthot Int. 2002;26(3):182-188.
18. Sarah A, Deans A K , Philip J R. Physical activity and quality of life: A study of a lower-limb amputee population. Prosthesis and orthotics international 2008; 32(2):186-200.

2012/21/12