

Factors of Lower Limb Prosthesis and Orthosis User's Satisfaction in Amhara National Regional State Rehabilitation Center, Ethiopia: An Institution-Based Cross-Sectional Study

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ABSTRACT

Background: Prosthesis and orthosis are assistive devices used for different forms of cases. Lower limb prostheses and orthoses are very crucial to improve patient's ability to walking, increased level of activity and participation to enhance their quality of life. However, there is limited knowledge of workplace variables that either satisfy or dissatisfy the prosthesis and orthosis users in the regional state, Ethiopia. Therefore, this study aimed to assess the satisfaction and associated factors among lower limb prosthesis and orthosis users in Amhara National Regional State Rehabilitation Center, Ethiopia.

Methods: Institution based cross-sectional study was conducted from April 01 to May 30, 2019, at Amhara National Regional State Rehabilitation Center among lower limb prosthesis and orthosis users. Data were collected using a structured interviewer-administered questionnaire by the standardized assessment tool; Quebec User Evaluation of Satisfaction with Assistive Technology (QUEST 2.0). The study included a total of 207 participants. Binary logistic regression analysis was performed. In the multivariable logistic regression analysis, p value < 0.05 and adjusted odds ratio (AOR) with 95% confidence interval (CI) were used to identify the associated factors.

Results: The study revealed that 56.5% (95% CI: 49.9-63.3) of lower limb prosthesis and orthosis users were satisfied. Experiencing pain (AOR: 5.56, 95%CI: 2.68-11.52), living in the rural area (AOR: 3.52, 95%CI: 1.51-8.21), use of prosthesis and orthosis devices on an average less than 9 hours (AOR=0.30, 95% CI 0.11-0.80) and 9-12 hours in a day (AOR: 0.16, 95% CI: 0.07-0.38) were factors significantly associated with satisfaction.

Conclusion: The magnitude of lower limb prosthesis and orthosis users' satisfaction was found to be relatively low. Therefore, healthcare providers and managers of the rehabilitation center need to emphasize on status of the client's device throughout patient care in the management of clients' pain and use of devices on an average hour per day.

Keywords: Satisfaction; Lower Limb Prosthesis; Orthosis Users; Amhara National Regional State

ABBREVIATIONS:

ANRSRC: Amhara National Regional State Rehabilitation Center; AOR: Adjusted Odd Ratio; CI: Confidence Interval; COR: Crude Odd Ratio; POC: Prosthesis and Orthosis Center; QUEST 2.0: Quebec User Evaluation of Satisfaction with Assistive Technology 2.0; SPSS: Statistical Package of the Social Science.

INTRODUCTION

Lower limb orthoses and prostheses are assertive devices used for patients with different kinds of diagnoses. An orthotic device is an externally applied device used to modify the structural and functional characteristics of the neuro-muscular and skeletal system as well as it is used to support patients with movement impairments, orthopedic injuries and musculoskeletal disorders [1,2].

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On the other hand, a Prosthetic device is an externally applied device used to replace wholly or in parts an absent or deficient limb segment [3,4]. Using these devices enhances individuals' functional mobility, compensates for a decreased or lost physical function, prevents future loss of ability and function, as a general it maximizes the overall quality of life of individuals who were have had mobility problems in different cases [5-7].

In developing countries, 0.5% of people with disabilities (PWD) had needs of prosthesis/orthosis and related rehabilitation services [8]. Another evidence showed, in low-income countries approximately 30 million individuals require prosthetic and orthotic services, among these 10 million of these were persons with lower-limb amputations who needs lower limb prosthetic device [9].

User satisfaction is an insight, attitudes and perception about client needs related to the quality of the devices and the services, which shows the extent of client's priority by identifying factors related to service and device [10]. It is supposed to be a predictor of the patients frequently wear as well as the long-term use of the device [2]. Moreover, it is an important outcome measure in the client-centered approach and an evidence-based healthcare system [1].

According to studies on the issue, several factors affect the satisfaction of lower limb prostheses and orthoses users. Provider competence, provision of information, emotional support, being treated with respect, efficiency, and facility are the most important factors which influence user's satisfaction [1].

Satisfaction studies need continuous investigates comparative to the changing standard of medical services. In Ethiopia, studies have not been conducted in this area; as a result, there is a scarcity of information about the relationship between the satisfaction of lower limb prostheses and orthoses users and other variables. Therefore, this study set out to assess factors that influence the satisfaction of lower limb prostheses and orthoses users at Amhara National Regional State rehabilitation center, Ethiopia.

METHODS

Study design and setting

An institution-based cross-sectional study was conducted from April 01 to May 30, 2019, at Amhara National Regional State Rehabilitation Center (ANRSRC) to assess the satisfaction of lower limb prostheses and orthoses users. The regional state is located in the northwestern and north-central parts of Ethiopia. It has 82 functional public hospitals (6 referral, 4 generals, and 73 primary) and 852 health centers [11]. The regional state has only two rehabilitation centers (Bahir Dar and Dessie). The study population was all lower limb prosthesis and orthosis users who came to get the service during the data collection period at the two rehabilitation centers in the regional state.

Sample size and sampling techniques

The required sample size was determined using a single population proportion formula with the assumptions of the

proportion of lower limb prostheses and orthoses users' satisfaction as 50% since there is no available literature that reported similar study, 95% confidence level and 0.05 margin of error were used. By considering 10% non-respondents final sample size became 422. However, the source population is lower than the calculated sample size. As a result, we interview the entire lower limb prosthesis and orthosis users who came to the rehabilitation center to get services during the study period. A total of 207 lower limb prosthesis and orthosis users (142 from Bahirdar and 65 from Dessie) rehabilitation centers were surveyed.

Measurements

Data were collected using a structured interviewer-administered questionnaire first prepared in English and translated to the local language, Amharic, and retranslated to English by another person to ensure consistency and accuracy. Two junior BSc physiotherapist data collectors and two experienced BSc physiotherapist supervisors were employed for the data collection process. One day training was provided on the techniques of interviewing, handling ethical issues and maintaining confidentiality and privacy.

The dependent variable, lower limb prosthesis and orthosis user's satisfaction was measured by the standardized assessment tool; Quebec User Evaluation of Satisfaction with Assistive Technology (QUEST 2.0) [12,13]. The tool comprises device satisfaction and service satisfaction items. The device satisfaction levels consist of 8 items including (dimensions, weight, ease in adjusting, safe and secure, durability, easy to use, comfort and effectiveness). Whereas, the service satisfaction level consists of 4 items (service delivery program, repair and servicing, quality of professional service and follow-up). In these items, respondents were asked to indicate the extent of their level of satisfaction using a five-point Likert scale (1: Not satisfied at all to 5: Very satisfied). Respondents who scored more than 60% of the sum of all the satisfaction scale items were considered as satisfied toward their devices and services and those below or equal to 60% were labeled as unsatisfied with the devices and services.

Data processing and analysis

Data were coded, checked for completeness and entered into Epi-info version 7 software and exported to SPSS version 20 software for cleaning, merging and analysis. Both descriptive and inferential statistics were computed and results were presented by using texts, tables, and figures. Item by item analysis and both bivariate and multivariable logistic regression analysis was used to identify associated factors that affect the level of satisfaction on lower limb prosthesis and orthoses users. Variables with a p value of less than <0.2 in the bivariate logistic regression were fitted into the multivariable logistic regression model. In the final model, variables with a p value<0.05 and adjusted odds ratio (AOR) with 95% Confidence Interval (CI) were used to declare the associated factors.

RESULTS

Socio-demographic characteristics of respondents

In this study, a total of 207 lower limb prostheses and orthoses users were interviewed. The majority of 142(68.6%) of the participants were from Bahirdar rehabilitation center. The mean (SD) age of participants was 36 (±13.8) years. The majority of participants were orthodox Christian in their religion 168(81.2%), males in their sex 153(73.9%) and married in their marital status 89(80.2%). A significant number of participants 57(27.5%) had a diploma and above in their educational status, whereas 63(30.4%) of the participant were a private employee (Table 1).

Table 1: Socio-demographic characteristics of participants in Amhara National Regional State Rehabilitation Center, Ethiopia, 2019 (n=207).

| Variables | Categories | Entire study group N (%) | Bahir Dar N (%) | Dessie N (%) |
|--------------------|--------------------------|--------------------------|-----------------|--------------|
| Place of POC | | 207(100) | 142(68.6) | 65(31.5) |
| Age | 16-29 | 89(43.0) | 64(71.9) | 25(28.1) |
| | 30-39 | 43(20.8) | 30(69.8) | 13(30.2) |
| | 40-49 | 36(17.4) | 15(41.7) | 21(58.3) |
| | >49 | 39(18.8) | 33(84.6) | 6(15.4) |
| Sex | Male | 153(73.9) | 106(74.6) | 47(72.3) |
| | Female | 54(26.1) | 36(25.4) | 18(27.7) |
| Residence | Urban | 156(75.4) | 115(81) | 41(63) |
| | Rural | 51(24.6) | 27(19) | 24(37) |
| Religion | Orthodox | 168(81.2) | 131(92.3) | 37(56.9) |
| | Muslim | 34(16.4%) | 6(4.2) | 28(43.1) |
| | Protestant | 3(1.4) | 3(2.1) | 0 |
| | Others | 2(1.0) | 2(1.4) | 0 |
| Marital status | Single | 96(46.4) | 77(69.4) | 34(30.6) |
| | Married | 111(46.4) | 65(67.7) | 31(32.3) |
| Educational status | Unable to read and write | 36(17.4) | 27(75) | 9(25) |
| | Able to read and write | 114(55.1) | 73(64) | 41(36) |
| | Diploma and above | 57(27.2) | 42(73.7) | 15(26.3) |

| | | | | |
|----------------------------------|------------------|-----------|-----------|----------|
| Employment status | Housewife | 11(5.3) | 8(72.7) | 3(27.3) |
| | Civil servant | 37(17.9) | 20(54.1) | 17(45.9) |
| | Private employee | 63(30.4) | 48(76.2) | 15(23.8) |
| | Farmer | 32(15.5) | 20(62.5) | 12(37.5) |
| Ability to pay the accommodation | Others* | 64(30.9) | 46(71.9) | 18(28.1) |
| | Yes | 38(18.4) | 18(12.7) | 20(30.8) |
| | No | 169(81.6) | 124(87.3) | 45(69.2) |

*=students, retire, commissioner and non-employee

Satisfaction related to the services, devices and the overall satisfaction

The overall satisfaction among lower limb prostheses and orthoses users in this study was 56.5% (95% CI: 49.9-63.3). Approximately, half (51.2%) of them were satisfied with the device whereas 72.5% of the respondents were satisfied with the service.

From a total of 207 respondents, 131(63.3%) were prosthesis users and the majority of them were from Bahirdar rehabilitation center 84(40.6%). Similarly, a significant amount of orthosis users was found at Bahirdar POC 58(28%). On the other hand, more than half of participants 108(52.2%) were used crutches. Among these 105(97.2%) users were used crutches together with devices. The most common causes of prosthesis users were because of war (bullet injury and heavy weapons), accidents (fall and snakebite) and car accident 30.5%, 20.6% and 18.3% respectively. On the other hand, the most common causes for orthosis users were polio, injection (paralysis) and congenital disorders 30.3%, 25% and 11.8% respectively (Table 2).

Table 2: Factors related to devices among prosthesis and orthosis users in Amhara National Regional State Rehabilitation Center, Ethiopia, 2019 (n=207).

| Variables | | Total score (%) | Bahir Dar N (%) | Dessie N (%) |
|------------------------------|------------|-----------------|-----------------|--------------|
| Level of an assistive device | Below knee | 116(56) | 74(52.1) | 42(64.6) |
| | Above knee | 91(44) | 68(47.9) | 23(35.4) |
| Prosthesis | Below knee | 99(75.6) | 59(70.2) | 40(85.1) |
| | Above knee | 32(24.4) | 25(29.8) | 7(14.9) |
| Orthosis | Below knee | 16(21.1) | 15(25.9) | 1(5.6) |
| | Above knee | 60(78.9) | 43(74.1) | 17(94.4) |

| | | | | |
|------------------------------------|---|-----------|-----------|----------|
| Current status of the device | Broken cannot use | 33(15.9) | 9(6.3) | 24(36.9) |
| | needs repair | 147(71) | 120(84.5) | 27(41.6) |
| | good condition | 27(13) | 13(9.2) | 14(21.5) |
| The number of years. since started | Less than 1 yrs. | 7(3.4) | 4(2.8) | 3(4.6) |
| | 1-5 yrs. | 56(27.1) | 27(19) | 29(44.7) |
| | 5-10 yrs. | 63(30.4) | 41(28.9) | 22(33.8) |
| Average hrs. used per day | More than 10 yrs. | 81(39.1) | 70(49.3) | 11(16.9) |
| | 1-4 hrs. | 10(4.8) | 10(7) | 0 |
| | 5-8 h | 29(14) | 15(10.6) | 14(21.5) |
| Crutches users | 9-12 h | 91(44) | 40(28.2) | 51(78.5) |
| | 13-16 h | 77(37.2) | 77(54.2) | 0 |
| | Instead of device or | 3(2.8) | 3(3.9) | 0 |
| Number of devices used | Together with | 105(97.2) | 74(96.1) | 31(100) |
| | One | 28(13.5) | 22(15.5) | 6(9.3) |
| | Two | 60(29) | 42(29.6) | 18(27.7) |
| | Three | 60(29) | 41(28.9) | 19(29.2) |
| | More than three | 59(28.5) | 37(26) | 22(33.8) |
| Pain | Yes | 108(52.2) | 66(61.1) | 42(38.9) |
| | No | 99(47.8) | 76(76.8) | 23(23.2) |
| Cause of the case | Car accident | 24(11.6) | 15(62.5) | 9(37.5) |
| | Accidents 1* | 44(21.3) | 27(61.4) | 17(38.6) |
| | Violence 2* | 47(22.7) | 37(78.7) | 10(21.3) |
| | Diabetes/elephantiasis Polio/paralysis/ injection | 29(14) | 18(62.1) | 11(37.9) |
| | Congenital disorder Undefined cause | 42(20.3) | 29(69) | 13(31) |
| | | 12(5.8) | 8(66.7) | 4(33.3) |
| | | 9(4.3) | 8(88.9) | 1(11.1) |

1* = fall down injury, fracture and snakebite 2* =bullet injury and heavy weapon with war

One hundred seventy-three (83.6%) of the study participants had a high level of satisfaction with the quality of professional

service and effectiveness of the device (the degree to which the device meets users need), safe and secure (83.1%), and easy to use (82.1%). On the other hand, 73(35.3%), 60(29%), and 47(22.7%) were reported to have been unsatisfied with dimension, follow up, and comfort of their device respectively (Table 3).

Table 3: Frequency and percentage of participants rating of QUEST 2.0 items in Amhara National Regional State Rehabilitation Center, Ethiopia, 2019 (n=207).

| Items | Unsatisfied n (%) | Satisfied n (%) |
|----------------------------------|-------------------|-----------------|
| Dimensions | 73(35.3) | 134(64.7) |
| Weight | 53(25.6) | 154(74.4) |
| Fixing and fastening | 49(23.7) | 158(76.3) |
| Safe and secure | 35(16.9) | 171(83.1) |
| Durability | 47(22.7) | 160(77.3) |
| Easy to use | 37(17.9) | 170(82.1) |
| Comfort | 58(28) | 149(72) |
| Effectiveness | 34(16.4) | 173(83.6) |
| Service delivery program | 47(22.7) | 160(77.3) |
| Repair and servicing | 51(24.6) | 156(75.4) |
| Quality of professional services | 34(16.4) | 173(83.6) |
| Follow up services | 60(29) | 147(71) |

The participants were asked to choose what they considered to be the three most important items among the 12 included items in QUEST 2.0. In the entire study in Bahirdar and Dessie stated that effectiveness (50.7%) of their assistive device was the most important item, followed by safe and secure (42.5%) and easy to use (38.5%) of the device. In Dessie (n=65) effectiveness(80%), easy to use(50.8%) and safe and secure(41.5%) were considered the most important items, while safe and secure(42.9%), effectiveness(37.3%) and easy to use(32.4%) of their assistive device were the most important items in Bahirdar (n=142).

Factor associated with overall satisfaction level related to prosthesis and orthosis users

In the multivariable logistic regression analysis, four variables were statistically significant. Accordingly, lower limb prosthesis and orthosis users (LLPOU) who did not experience pain were 5.56 times more likely to be satisfied compared with those who had experienced pain (AOR: 5.56, 95% CI: 2.28-11.52). Those study participants who came from the rural area were 3.52 times

more likely to be satisfied compared to participants who came from urban areas (AOR: 3.52, 95% CI: 1.51-8.21).

Similarly, respondents who used lower limb prosthesis and orthosis devices for an average less than nine hours in a day were 70% less likely satisfied compared to respondents who used devices 13-16 hours a day (AOR: 0.30, 95% CI: 0.11-0.80) and LLPOU who have used the device for 9-12 hours were 84% less likely satisfied compared to respondents who used devices 13-16 hours a day (AOR: 0.16, 95% CI: 0.07-0.38). The satisfaction of lower limb prosthesis and orthosis users was higher among respondents who were from Bahirdar Place of rehabilitation center (POC) compared to those who were Dessie POC (Table 4).

Table 4: Factors associated with overall satisfaction among prosthesis and orthosis users in Amhara National Regional State Rehabilitation Center, Ethiopia, 2019 (n=207).

| | Level of Satisfaction | | OR with 95% CI | |
|-------------------------------|-----------------------|-----------|--------------------|--------------------|
| | Unsatisfied | Satisfied | COR | AOR |
| Sex of respondents | | | | |
| Male | 59(38.6) | 94(61.4) | 2.15 (1.14-4.03)* | 1.53 (0.69-3.43) |
| Female | 31(57.4) | 23(42.6) | 1 | 1 |
| Age of the respondents | | | | |
| 16-29 | 43(48.3) | 46(51.7) | 1 | 1 |
| 30-39 | 19(44.2) | 24(55.8) | 1.18 (0.57-2.45) | 0.52 (0.20-1.35) |
| 40-49 | 11(30.6) | 25(69.4) | 2.13 (0.93-4.83) | 0.89 (0.26-2.91) |
| 50-59 | 5(26.3) | 14(73.7) | 2.62 (0.87-7.88) | 1.10 (0.26-4.65) |
| 60-70 | 12(60) | 8(40) | 0.62 (0.23-1.67) | 0.69 (0.18-2.58) |
| Marital status | | | | |
| Married | 43(38.7) | 68(61.3) | 1 | 1 |
| Single | 47(49) | 49(51) | 0.66 (0.38-1.15) | 0.84 (0.41-1.70) |
| Residence | | | | |
| Urban | 77(49.4) | 79(50.6) | 1 | 1 |
| Rural | 13(25.5) | 38(74.5) | 2.85 (1.41-5.76)** | 3.52 (1.51-8.21)** |
| Employment status | | | | |
| Housewife | 7(63.6) | 4(36.4) | 1 | 1 |
| Civil servant | 16(43.2) | 21(56.8) | 2.30 (0.57-9.22) | 2.24 (0.25-19.74) |

| | | | | |
|----------------------------------|----------|----------|--------------------|---------------------|
| Private employee | 26(41.3) | 37(58.7) | 2.49 (0.66-9.39) | 2.36 (0.27-20.56) |
| Farmers | 10(31.2) | 22(68.8) | 3.85 (0.91-16.22) | 1.48 (0.14-15.31) |
| Others | 31(48.4) | 33(51.6) | 1.86 (0.49-6.99) | 2.58 (0.31-21.29) |
| Place of POC | | | | |
| Bahir Dar | 73(51.4) | 69(48.6) | 0.34 (0.18-0.64)** | 0.09 (0.03-0.22)** |
| Dessie | 17(26.2) | 48(73.8) | 1 | 1 |
| Current status of devices | | | | |
| Broken cannot be used | 11(33.3) | 22(66.7) | 1 | 1 |
| In use but need repair | 70(47.6) | 77(52.4) | 0.55 (0.25-1.22) | 1.01 (0.36-2.82) |
| In use and good condition | 9(33.3) | 18(56.7) | 1.00 (0.34-2.94) | 1.45 (0.38-5.56) |
| Average hrs. | | | | |
| <9 h | 16(41.0) | 23(59.0) | 0.82 (0.37-1.81) | 0.30 (0.11-0.80)* |
| 9-12 h | 46(50.5) | 45(49.5) | 0.56 (0.30-1.03) | 0.16 (0.07-0.38)** |
| 13-16 h | 28(36.4) | 49(63.6) | 1 | 1 |
| Pain | | | | |
| Yes | 61(56.5) | 47(43.5) | 1 | 1 |
| No | 29(29.3) | 70(70.7) | 3.13 (1.76-5.57)** | 5.56 (2.68-11.52)** |

*=p value<0.05, **=p<0.01 and ***=p<0.001, 1= constant, COR=crude odd ratio, AOD=adjusted odd ratio

DISCUSSION

Our finding shows that 56.5% of lower limb prosthesis and orthosis users in the study area were satisfied with the device and services provided. This result is lower than those of studies conducted in Taiwan (65.3%) [1] and America (75.7%) [14]. Additionally, our finding is much lower than those of studies conducted among lower limb prosthesis and orthosis users at Vietnams (93%) [15], and Netherland (78%) [16]. These differences could be due to variations in sociodemographic characteristics, living environment, and quality of the facility, living standards, and homogeneity of participants.

However, it is higher than the result of studies done in Tehran (Iran) (17%) [10] with their devices and lowers compared with

their services (74%) overall satisfaction. This might be because of the facility, and the perception or needs of clients may be highly related to their careers.

Regarding factors that could be associated with overall satisfaction level, place of residence, site POC, average hours used per day, and participants who had experienced pain were significantly associated with overall satisfaction among device and service users in Amhara regional state rehabilitation center.

Our study identified that lower limb prosthesis and orthosis users who did not experience pain were 5.56 times more likely to be satisfied compared with those who experienced pain. This finding is in agreement with those of studies done at Malawi and Sierra Leone [17], and Sierra Leone [18].

The satisfaction of lower limb prosthesis and orthosis users was higher among respondents from Bahir Dar place of rehabilitation center (POC) compared to Dessie POC. This might be a difference in facility and lack of professionals that are experts in prosthesis and orthosis devices and other areas of experts at Dessie POC.

Our finding also shows that lower limb prosthesis and orthosis device use on an average hour per day were significantly associated factors with the satisfaction of respondents. Respondents who use lower limb prosthesis and orthosis devices less than 9 h and 9-12 h on average per day were 70% and 84% less likely to satisfy as compared with those participants who use the device on average 13-16 h per day respectively. This might be because as the average time per day increases, there may develop pain and other discomforts that make them dissatisfied.

Moreover, the findings show that the study participants who came from the rural area were 3.52 times more likely to be satisfied compared with their urban counterparts. This might be because of their needs higher compared to rural area clients.

CONCLUSION AND RECOMMENDATIONS

The overall satisfaction among prosthesis and orthosis users was found to be low in Amhara National Regional State Rehabilitation Center. Experience of pain, use of devices on an average hour per day, place of residence and rehabilitation center were significantly associated factors that influence the satisfaction of clients. Therefore, healthcare providers and managers of the rehabilitation center need to emphasize on status of the client's device throughout patient care.

LIMITATIONS OF THE STUDY

The findings of this study might be subjected to social desirability bias because the respondents were interviewed by health professionals. Furthermore, the study was not triangulated with a qualitative method.

ETHICS APPROVAL AND CONSENT TO PARTICIPATE

Ethical clearance was obtained from the Ethical Review Committee of the Institute of Public Health, College of Medicine and Health Sciences, the University of Gondar (Ref. No. IPH/180/06/2011). Before contacting the study participant official letters were obtained from the Amhara National

Regional State Health Bureau and, from Bahirdar and Dessie prosthesis orthoses care center administrators. Full information was given to participants regarding the purpose and importance of the study. They were also informed that they were free to refuse to participate or answer any of the questions without any restriction before they provided their written consent. Names of participants and any personal identifiers were not included in the study to maintain the confidentiality of data at all levels of the study.

CONSENT FOR PUBLICATION

Not applicable

AVAILABILITY OF DATA AND MATERIALS

Data will be available upon reasonable request from the corresponding author.

COMPETING INTERESTS

The authors declare that they have no competing interests.

AUTHORS' CONTRIBUTIONS

TK and ED conceived of the study, developed the tool, coordinated the data collection activity, and carried out the statistical analysis. TK, ED, TD and JS participated in the statistical analysis, revision of the paper and drafted the manuscript. All authors read and approved the final manuscript.

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