ORIGINAL ARTICLE

Earnings among people with spinal cord injury

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Study design: Secondary analysis of cross-sectional data.

Objectives: To identify differences in earnings among participants with spinal cord injury (SCI) and their relation to demographic, injury, educational and employment-related factors.

Setting: People living with SCI in the community who were members of a disability support organization.

Methods: A total of 76 members who have had traumatic SCI for at least 2 years, between 15 and 64 years of age at time of study and were working before SCI were interviewed over the phone. The earnings were categorized as more, same or less than before SCI or no income for those unemployed.

Results: Of the 76 participants (who averaged about 15.1 years post SCI), only 13 participants (17.1%) were earning more than before injury, whereas majority were in the category of having no income, being unemployed at time of study, $n = 36$ (47.4%). Factors positively related to earnings were having more years in education, both at time of injury and at time of survey. As anticipated, those currently in full time and paid employments were earning more while receipt of financial compensation was negatively related to earnings.

Conclusion: Despite a lengthy period of time post SCI, only a minority were earning more, reflecting poorly on the quality of post SCI employment experience. The rehabilitation team should therefore focus on improving both educational and vocational opportunities for persons with SCI and aim for full time, paid employments. The current workers' compensation scheme renders the recipient at a static income and may need to be revised.

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Introduction

Spinal cord injury (SCI) can result in multiple impairments, which in interaction with a person's environment, can lead to significant limitation in activity and participation. Return to work after SCI has been frequently measured in rehabilitation research as one of the indicators of success in integration.^{1,2} However, the return rates in published literature varies greatly from as low as 13.8% in a review by Yasuda *et al.*,³ to as high as 67.0% in another review by Lidal *et al.*,⁴ and it is uncertain whether this is a true reflection of the success (or lack) of rehabilitation efforts. It has to be acknowledged that the measured rates vary widely, largely because of different definitions of employment, as well as employment rates.

In an attempt to achieve some measure of objectivity and standardization, and also in line with one of the recommendations by Young and Murphy⁵ in a recent review on

employment research after SCI, this author (K Ramakrishnan *et al.*)⁷ used International Labor Organisation's definition of employment,⁶ to derive a return rate of 57.1% at the time of study with 76.2% having worked at some point after injury. It has, however, been acknowledged that these relatively high rates might signify economic desperation on the part of persons living with SCI as opposed to better adjustment. What would be of great interest then, is to measure the quality of post injury employment experience and one way this could be done is by measuring the income earned.

It was hypothesized therefore that comparing the income pre and post SCI would be a better indicator of success of integration and quality of life post SCI as opposed to return rates alone. In a recent review by Ottomanelli *et al.*,⁸ on critical factors related to employment after SCI, one of the recommendations was to include employment-specific outcome data such as duration of employment, job tenure and also wages earned in future employment research.

The overarching idea therefore was that with the passing of years, income earned from an occupation should be on the upward trend. If this is not so then, we need to know the reasons why and the factors affecting income. In looking at

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factors predictive of disparities in earnings post SCI, Krause and Terza⁹ found that earnings were significantly higher among men, non-African Americans, those aged 34 and less, ambulatory and those with a college degree. In another larger study, the authors found that sex and race were significantly related to earnings even after controlling for educational and vocational variables.¹⁰

Therefore the objectives of this study (which is a secondary analysis of the previously mentioned study;⁷ excluding those without any work experience before SCI) were to identify differences in earnings among participants pre and post SCI and also to identify the relation between demographic, injury, educational and employment-related factors to earnings.

Methods

Participants and procedures

Participants were randomly selected from the Malaysian Spinal Injury Association's (MASIA) membership list. MASIA is a non-governmental voluntary organization that primarily functions as a support group for persons living with SCI in the community. MASIA was chosen for sampling as it had a large number of members (306 at the time of this study) of various age, education and ethnic groups from almost all the different states in Malaysia (rural and urban areas). On the other hand, the databases from the two major urban hospitals in Malaysia with SCI rehabilitation units, University Malaya Medical Center and Hospital Kuala Lumpur were incomplete.

There were four inclusion criteria: (i) traumatic SCI, (ii) minimum 2-years post injury (iii) age between 15 to 64 years and (iv) had worked at some point before SCI. The age group was chosen based on Malaysian Department of Statistics definition of economically active population.¹¹ This term of reference is also used in Malaysian Labor Force Survey and the population census, and it is also in accordance with the recommendation by Young and Murphy.⁵ MASIA's membership list was alphabetically ordered and 155 persons were selected using random sampling technique. Out of 155, there were 50 (32.2%) non-responders and in the remaining 105 persons, only 76 participants fulfilled all the study criteria and were used in the final analysis as shown in the flowchart in Figure 1. Approval to conduct this study was obtained from the Ethics Committee of University Malaya Medical Center (UMMC), Malaysia.

Measure

A self-designed questionnaire with the main outcome variable being the actual earnings (in Malaysian Ringgit) before and after injury, was first, piloted among persons with SCI attending rehabilitation clinic in UMMC. However, it was discovered that almost all participants were reluctant to disclose the actual amount of earnings, due to privacy concerns. They were, however, comfortable with disclosing whether it was same, more or less than before SCI, and therefore this was used as a proxy measure instead of the actual earnings. Those who were unemployed at the time of

Figure 1 Shows the flow of study participants from selection to study participation.

the study were categorized as having no income. It was hypothesized that given the length of time (minimum of 2 years) that has passed since the onset of SCI, the income should be more than what it was before. Therefore for comparative analyses, the study participants were grouped into two groups, those with more income and those with same, less or no income post SCI.

In accordance with the resolution concerning statistics of the economically active population, adopted by the 13th International Conference of Labor Statisticians (Geneva 1982) (ref. 6), participants in both paid employment and self-employment were considered as income earners. Paid employments are those jobs where the incumbents hold explicit (written or oral) or implicit contracts and are typically remunerated by wages and salaries. Self-employments are those jobs where the remuneration is directly dependent upon the profits derived from the goods and services produced.

The International Standards for Neurological Classification of SCI by the American Spinal Injury Association could not be followed to determine the neurological level or completeness of the injury, as this study was based on self-reported data. Participants were interviewed as to whether they have weakness in the legs only (paraplegia) or involving the upper extremities as well (tetraplegia). Education status was measured by the number of years of study both at the time of SCI and at the time of survey. Given that income from any occupation is also dependant on number of years in service, this measure was also included in the form of work duration. The participants were also asked whether they were receiving any financial compensation. For those

who were employed at the time of the study, they were also asked whether they (i) returned to pre-injury employer and/or job, (ii) returned to full-time or part-time employment and (iii) paid or self-employment. (A copy of the study questionnaire is available on request from the corresponding author).

It was hypothesized that returning to pre-injury employer and/or employment, working full time as opposed to part time and also working at paid jobs as opposed to self-employment would result in higher earnings and should therefore be the ideal targetted return to work goals for the rehabilitation team working with persons with SCI.

Analyses

Differences in the variables between the two groups (with more earnings and with same, less or no income post SCI) were tested using Pearson's Chi square statistics for categorical variables such as injury severity and independent sample *t* test for continuous variables such as years in education. The significance level was chosen as $P < 0.05$.

Results

Descriptive statistics for study participants

Most participants were male (84.2%) and half were of Chinese ethnicity (50.0%). Motor vehicle crash was the primary etiology (73.7%). Majority had paraplegia (77.6%). The mean age, at time of injury was 25.3 years (s.d. = 8.7), and ranged between 6 and 48 years. The mean age at the time of study was 40.4 (s.d. = 10.2), the youngest participant was 22 years of age and the oldest 62. The mean duration of injury in this study was 15.1 years (s.d. = 8.5), with the range of 2.0–44.0 years.

Earnings post SCI

Out of the 76 participants, only 13 participants (17.1%) were earning more than before injury. In all, 17 (22.4%) were earning less, whereas 10 (13.2%) were earning about the same income and there were 36 (47.4%) participants with no income (unemployed) at the time of this study. Out of the 40 (52.6%) persons who were working at the time of this study, majority (72.5%) were in full time as opposed to part time and self-employment (67.5%) as opposed to paid employment.

Impact of the various demographic, injury and work-related variables on earnings

None of the demographic or injury-related factors affected the income earned post SCI as shown in Table 1. However receipt of financial compensation was negatively related to income, with the large majority (91.5%) being in the category of receiving same, less or no income. As hypothesized, being in full-time work and in paid employment was advantageous to income. However, returning to pre-injury employer and employment missed significance ($P = 0.14$), possibly due to the small number of participants in the subgroups. Number of years in education, both at time of injury as well as at time of study were positively related to

Table 1 Showing characteristics of those earning more income and those earning same, less or nil income post SCI

Category	Group	More income n (%)	Same, less or nil income n (%)	P	OR (95% CI)
Gender	Male	10 (15.6)	54 (84.4)	0.42	
	Female	3 (25.0)	9 (75.0)		
Race	Malay	4 (16.0)	21 (84.0)	0.53	
	Chinese	8 (21.1)	30 (78.9)		
	Indian	1 (7.7)	12 (92.3)		
Level	Paraplegia	10 (16.9)	49 (83.1)	0.94	
	Tetraplegia	3 (17.6)	14 (82.4)		
Financial incentives	Yes	5 (8.5)	54 (91.5)	0.00*	0.10 (0.03–0.39)
	No	8 (47.1)	9 (52.9)		
(For those working at time of survey)					
Same job	Yes	3 (60.0)	2 (40.0)	0.14	
	No	8 (25.0)	24 (75.0)		
Same employer	Yes	3 (60.0)	2 (40.0)	0.14	
	No	8 (25.0)	24 (75.0)		
Full time		12 (41.4)	17 (58.6)	0.05*	7.1 (0.8–62.7)
Part time		1 (9.1)	10 (90.9)	0.04*	4.1 (1.0–16.9)
Paid employment		7 (53.8)	6 (46.2)		
Self-employed		6 (22.2)	21 (77.8)		

Abbreviations: CI, confidence interval; OR, odds ratio; SCI, spinal cord injury. Values given are number and percent (%).

**P* values obtained from Pearson's Chi square statistics, considered significant if < 0.05 , and the odds ratios are given with 95% confidence interval.

Table 2 Showing characteristics of those earning more income and those earning same, less or nil income post SCI

Category	More income (n = 13) Years (s.d.)	Same, less or nil income (n = 63) Years (s.d.)	t ^a	P
<i>Number of years in education</i>				
Before injury	10.8 (2.7)	8.8 (3.5)	2.27	0.03
At time of study	11.2 (2.7)	9.1 (3.7)	2.46	0.02
Time since injury	17.0 (8.0)	14.7 (8.6)	0.93	0.36
Age at injury	23.9 (6.7)	25.6 (9.1)	−0.78	0.45
Age at time of study	40.9 (9.2)	40.3 (10.5)	0.20	0.84
Work duration	11.1 (5.9)	8.3 (7.7)	1.37	0.18

Values given are average (mean) time in years and s.d.

^aValues obtained are from independent samples *t* test with equal variances not assumed.

income in this study, as shown in Table 2. Although those with more income have had longer work duration (average of 11.1 years, as opposed to 8.3 years in those without), the difference did not achieve statistical significance ($P = 0.18$).

Discussion

Despite a lengthy period of time since injury onset (average of 15 years), only a minority were earning more income than before injury in this study. This is definitely of concern as it reflects poorly on the quality of post SCI employment experience. As postulated in the previous study,⁷ the high

return to work rate alone may not be sufficient to draw conclusion about the success of adjustment post SCI (indirectly reflecting success of rehabilitation efforts). Whereby majority were in self-employment and very few returned to their pre-injury employment or employer, with incomes that have not changed much with the years, and some even earning less or no income. It can be concluded that there is a very high likelihood that persons with SCI are being disadvantaged at competitive paid employment, both at the level of maintaining their previous occupations and also obtaining new ones, possibly leaving no option but to be self-employed with unsatisfactory income levels or worse still, remaining unemployed.

It is possible that those receiving financial compensation would choose not to reenter competitive employment but the fact their incomes remain mostly static with the progression of years is of concern. This is due to the fact that cost of living naturally goes up with time and also persons with medical problems would incur extra expenses such as equipment, medical and travel costs. One possible solution therefore, is to revise the present workers' compensation scheme to promote and encourage return to work as much as possible.

In this study, neither race nor gender resulted in disparities in income as was found in other studies.^{9,10} What is in agreement, however, is the fact that the higher number of years in education is definitely a booster to income earned and therefore every effort should be made by the rehabilitation team to encourage further study or skills training. The need for the various institutions of higher learning and skills training, both public and private to be more responsive and accommodating to the needs of the disabled population cannot be overstated. It also remains crucial that pro-disability legislations are enforced appropriately, such as providing access to buildings and public transportations.

Limitations

There are several limitations of this study. First, in terms of generalizability of result, there were small number of participants in some important subgroups, such as gender, persons with tetraplegia and those who returned to their former employments. There is also the possibility that members of a non-governmental organization maybe more motivated and therefore not truly representative of people living with SCI in the community. Moreover, data (especially income) were self-report with potential for bias and inaccuracies. This research also did not look into type of occupation

or employer (whether public or private enterprise) that could also have influenced income.

Conclusion

Despite a lengthy period of time post SCI, only a minority were earning more, reflecting poorly on the quality of post SCI employment experience. The rehabilitation team should therefore focus on improving both educational and vocational opportunity for persons with SCI and aim for full-time and paid employment as opposed to part time and self-employment. The current workers' compensation scheme renders the recipient at a static income and may need to be revised.

Conflict of interest

The authors declare no conflict of interest.

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