

## ORIGINAL ARTICLE

# TEST-RETEST RELIABILITY OF THE MALAY VERSION JOB CONTENT QUESTIONNAIRE (M-JCQ) AMONG LINEMEN WORKING IN THE ELECTRICITY SECTOR

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## ABSTRACT

This cross sectional study investigated the test -retest reliability of the Malay Version Job Content Questionnaire (M- JCQ) among electricity linemen. The M-JCQ questionnaire was administered to 10 electricity linemen working in private sub-contract company. The data were collected at two occasions with one week interval of time between each sessions. Intraclass Correlation Coefficient (ICC) and Bland Altman plot were used to analyze the reliability of the M-JCQ. The ICC for the 'psychological demand', 'decision latitude', 'work related social support' and 'job insecurity' scale were 0.96, 0.52, 0.99 and 0.55 respectively. The Bland Altman plot indicated that the tests and retest score for all the four scales had an acceptable agreement. These findings indicated that the M- JCQ is reliable and consistent for assessing work related psychosocial risk factors among electricity linemen.

**Keywords:** Job content questionnaire , Psychological Stress, Reliability, Linemen, Occupational Health

## INTRODUCTION

In the last two decades, numerous research supports poor psychosocial working conditions can have adverse health effects to the working populations<sup>1,2</sup>. Researchers use different types of instruments to assess the presence of psychosocial risk factors among workers. The Job Content Questionnaire (JCQ) based on the Karasek Demand -Control theory is the most popular instrument used to assess the presence of psychosocial risk factors among various occupations<sup>1,2</sup>. The Job Content Questionnaire (JCQ) combines two psychosocial domains, namely psychological demand and decision latitude<sup>1,2</sup>. Psychological demand is defined as perception of an individual on their work intensity with which he or she is required to perform a task in the middle of the existing conflicts in a work relationship<sup>3</sup>. The level of decision latitude is the capacity of the individual to make decision and develop skills according to requirement of the authorities<sup>4</sup>. In addition, the sub domains of JCQ are extended to integrate work related social support to understand how the social support in the working environment affects the well being of the workers<sup>5</sup>. Lately, work related social support has become the most important factor in determining the mental health of the workers. Evidences had shown that low social interaction between the co workers and supervisors in the working environment may lead to high job stress level among workers<sup>6,7</sup>.

High psychological demand and low decision latitude cause various types of job strains among

the workers<sup>2</sup>. According to the Karasek Demand - Control theory, the combination of high psychological demand and low decision latitude may lead to different type of job strains such as cardiovascular diseases, mental disorders and musculoskeletal disorders<sup>8,9,10,11,12</sup>. As linemen population are categorized into blue collar workers, it was expected that linemen population may suffer from different type of job strains such as cardiovascular diseases and musculoskeletal disorders<sup>7,8</sup>. In addition, various surveillance studies in Asian countries have shown a decrease in the organization productivity due to a different type of job strains among workers<sup>1,2</sup>. Therefore, the researchers widely use JCQ among the working population to identify the workers who are prone to get job strains earlier, thereby to design measures to reduce the absenteeism from work place.

Despite the fact that JCQ have been incorporated and proven reliable mostly in the Western Countries, the diversity and reliability of the JCQ scale among populations with different type of cultures still remain doubtful<sup>13</sup>. Few studies had included JCQ Malay version in assessing the psychosocial risk factors among blue collar workers<sup>14,15</sup>. However the ability of M-JCQ to differentiate between different type of occupations and working populations under repeated similar assessment conditions has become a major concern for researchers. In other words, the reliability of the (M-JCQ) among blue collar works are less studied. Also, it is recommended that the reliability of an instrument needs to be established on the

specific population prior to the use of the instrument on the desired population for producing a trustworthy data<sup>16</sup>. Currently, the work related psychosocial risk factors among electricity linemen is investigated using M-JCQ in an ongoing longitudinal study. Hence, it is important to establish the reliability of M-JCQ among electricity linemen prior to the application of the tool, to produce clinically trustful data on the electricity linemen population.

## SUBJECTS AND METHODS

The current study was conducted as a cross sectional design to evaluate the test - retest reliability of the M-JCQ scale among electricity linemen. The electricity linemen were recruited based on convenient sampling from a private company which involves in civil and electrical sub projects in Malaysia. A convenient type of sampling was chosen due to the participants inaccessibility at certain project area. The recruitment of the participants was based on the pre-defined inclusion and exclusion criteria. The exclusion criteria for the current study were workers with less than one year of working experience, workers who had undergone any recent hospitalization due to any health conditions and workers who lost any of their family members recently. Any workers who worked as a full time employee with more than one year of service were included as participants. In addition, workers who are able to read and write Malay language were included in the current study. The purpose and information about the study were briefed to all the participants prior to their enrollment in the study. All the participants gave written informed consent prior to the participation in the study. The study obtained ethical approval from an Institutional research ethical approval board (UKM 1.5.3.5/244/NN-086-2014 ) for conducting the study.

### Questionnaires

The M-JCQ constitutes of three major scales that includes decision latitude, psychological job demands and work related social support<sup>17, 18</sup>. Additionally, job insecurity was also included as an additional component in M-JCQ. The decision latitude includes 8 items of questions to measure two sub scales namely skill discretion and decision authority. The items were scored using Likert scale between a range of 1 (strongly disagree) to 4 (strongly agree). The psychological demand scales were measured by 5 items with values of scale ranging from 1 (strongly disagree) to 5 (strongly agree). The work related support has two sub scales that includes supervisor support and co-worker support as measured by 8

items<sup>19</sup>. Each item was recorded using the Likert scale ranging from 1 (strongly disagree) to 4 (strongly agree). In addition, job insecurity consists of 3 items<sup>20</sup>. Each item in job insecurity has different response categorization that ranges between 1 to 4<sup>20</sup>.

### Data collection

The M- JCQ was distributed as a self administered questionnaire to 10 linemen on their project site by the research officer at two different occasions. The participants were instructed to fill up the questionnaire by their own on the field. The completeness of questionnaire was assessed and verified by the research officer who was present at the project site. A period of one week of time interval were given between the distribution of first and second set of questionnaires.

The participants were revisited at their project site after one week and the second set of (M-JCQ) were distributed. An average of 15 minutes were taken by each participant to complete the questionnaire for each session.

### Data analysis

Data analysis were performed using the SPSS version 19. Intraclass correlation coefficient (ICC 2,1) with 95% confidence interval (CI) was calculated to find the test retest reliability of the four major scales of the (M-JCQ). The ICC values ranges from 0 to 1, with higher values indicating better reliability. ICC less than 0.40 were considered as poor; 0.4 to 0.8 to have moderate reliability and more than 0.8 indicated as excellent reliability<sup>21</sup>. In addition, Bland Altman plot was used to estimate the agreement between the first and second scores of (M-JCQ). The Bland Altman plot was constructed by plotting the differences between test and retest score on y-axis against the average of the total score of test and retest on x - axis<sup>22</sup>.

## RESULTS

### Characteristics of Sample Population

The study population was composed of 10 male workers. All of the workers are from Malay ethnicity background. Table 1 represents the characteristics of the population. All of the workers were having more than one year of working experiences and all of the workers had certified specific training from National Institute of Occupational and Safety Health for linemen working tasks. The majority (80%) of the linemen were within (20-30) years of age. In terms of education status, all of them has completed higher secondary schools. None of the linemen reported any recent hospitalization.

**Table 1: Socio Demographic Characteristics of the Linemen population**

Variables	Frequencies
<b>Age</b>	
20-30	80% ( n = 8)
30-40	20% ( n= 2)
<b>Gender</b>	
Male	100% ( n= 10)
<b>Marital Status</b>	
Single	60% ( n=6)
Married	40% ( n=4)
<b>Type of staff</b>	
Permanent	100% ( n=10)
<b>History of Smoking</b>	
Yes	20% ( n=2)
No	80% ( n= 8)

The results of the ( ICC 2,1) for (M-JCQ) showed that the ICC for decision latitude, job demand, work related support and job insecurity were 0.96 (95% CI: 0.85-0.99), 0.52 (95% CI: -0.95-0.88), 0.99 (95% CI: 1.00-1.00) and 0.55 (95% CI: -0.77 -0.89) respectively. The decision latitude

and work related support scale show an excellent test -retest reliability with ICC score more than 0.80. In addition, job demand and job insecurity scale has moderate test retest reliability score. Table 2 indicates the ICC values for the (M-JCQ) instrument.

**Table 2: Intra Class Coefficient (ICC) of the Scales: Decision Latitude, Job Demand, Work Related Social Support and Job Insecurity**

Job Content Questionnaire Scale	Number of Items	ICC (95% CI)	Level of reliability
Decision Latitude	8	<b>0.96 ( 0.85-0.99)</b>	Excellent reliability
Psychological Demand	5	<b>0.52 ( -0.95-0.88)</b>	Moderate reliability
Work Related Social Support	8	<b>1.00 ( 1.00-1.00)</b>	Excellent reliability
Job insecurity	3	<b>0.55 ( -0.77-0.89)</b>	Moderate reliability

Figure 1 describes the results of the Bland Altman Plot analysis for the agreement between the first and second measures of (M-JCQ). In the analysis of the job demand, work related social support, decision latitude and job insecurity scales in the Bland Altman plot, the mean scores between test and retest was found in X axis. The y axis shows the differences between the first interview (test) and second interviews (retest). Based on the Bland Altman plot analysis, the mean differences of the psychological demand ( Figure 1 a) between test and retest was (1.8) and 95 % limit of agreement was between (8.1) and (-4.5). The results indicated that the scores of psychological demand were found in limit of agreement between the 1<sup>st</sup> and the 2<sup>nd</sup> administration of (M-JCQ). However, one of the participant's total score of psychological demand was outside of limit of agreement (LOA).

In terms of work related support ( Figure 1 b) , the result shows that the mean of (- 0.1) differences with 95% of limit of agreement between (1.02) and (- 1.22). The results of work related support among linemen showed a

negative difference between test and retest, revealing a higher concentration in the upper limit of the plot which indicates a lower scoring of work related support in the retest.

In case of 'Decision Latitude' ( Figure 1 c) the result of Bland-Altman plot presents the mean of (0.6) differences and 95 % limit of agreement of decision latitude are located between the mean differences plus two standard deviations (8.87 decision latitude) and minus two standard deviations (- 7.67 decision latitude). The plot exposed an equal distribution between upper and lower limit.

Lastly, job insecurity ( Figure 1 d) , the results shows that the mean of (-1.0) differences with 95% limit of agreement of scores on job insecurity are situated between (1.2 job insecurity) and (-3.2 job insecurity). The Bland Altman plot for job insecurity in the workplace showed a positive trend toward upper limit, thus indicating an underestimation of informed values in the retest. Visual interpretation of all the plots showed that all the measurements were

within the range of  $\pm 2SD$  which indicated that the scores of both test and retest has an

acceptable agreement.

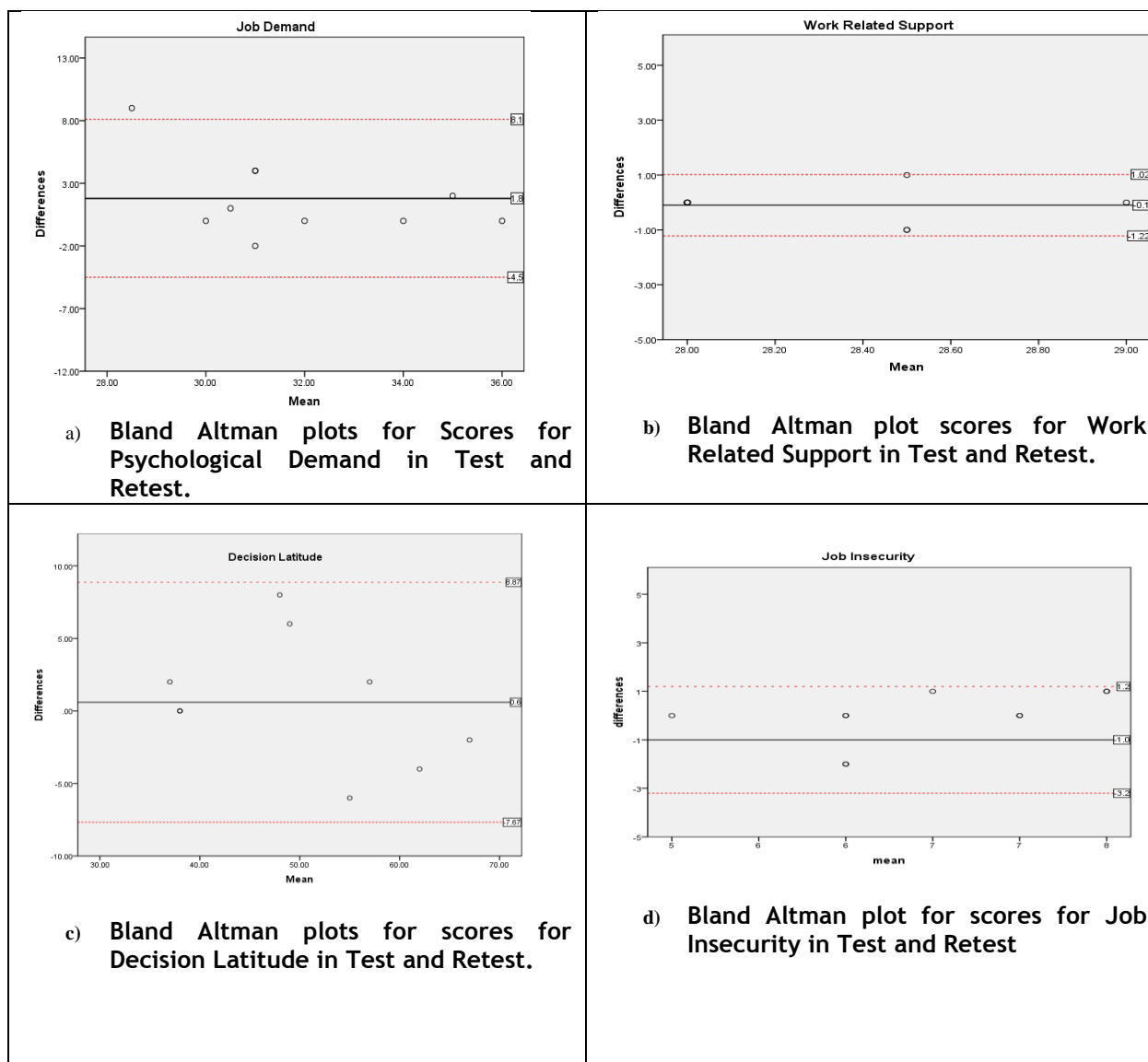


Figure 1: Bland Altman Plot for ( M- JCQ )

## DISCUSSION

The test retest reliability of psychometric properties of the (M-JCQ) among electricity linemen were examined in the current study. The selected scales such as decision latitude, psychological demand, work related social support and job insecurity indicated a good reliability of the instrument. Intraclass coefficient (ICC 2,1) for decision latitude, psychological demand, work related social support and job insecurity was 0.96, 0.52, 0.99 and 0.55 respectively. The agreement of the M-JCQ scales between test and retest among linemen population was considered good. The findings of the study supported that the (M-JCQ) is a reliable tool that can be used for collection of information regarding work related psychosocial risk factors among electricity linemen.

The current results on the reliability of (M-JCQ) were comparable to the reliability of the Portuguese Version of JCQ tool<sup>23</sup>. The values of reliability for the Portugal version of JCQ showed an acceptable ICC values of for decision latitude and work related social support<sup>23</sup>. In addition, shortened and modified version of JCQ translated in Japanese language among working women in the nursery also showed an ICC value greater than 0.80 for decision latitude and work related social support scale<sup>24</sup>. Nevertheless, the reliability of psychological demand results was different between the past studies where the ICC showed a lower value (ICC = 0.52) in the current study<sup>23, 24</sup>. The differences of 'psychology demand' results may be due to the different type of occupation populations that has been used. According to the Arouja and Karasek, 'psychological demand' can be understood in different manners by different types of working populations and working culture<sup>25</sup>. In the current study, the linemen population

is considered as blue collar workers due to their physically demanding on-field tasks<sup>26</sup>. However, the previous studies used sample populations that were based on the white collar workers, which involves less strenuous job tasks. Hence the different need of working performances in both type occupations may influence the interpretation and understanding of the psychological demand scale. As in further, it also strengthened the need for looking into the reliability of (M-JCQ) among different type of occupations and work context. In addition, the job insecurity in the current study showed a moderate test retest ICC [0.55] reliability score which is similar similar to the previous study reported in the Iran<sup>27</sup>. The moderate test retest reliability value for job insecurity scale in the current study may be due to the fear of unemployment and job insecurity felt by the participants<sup>27</sup>.

Agreement of the test and retest score was evaluated by Bland Altman plot. The plot indicates that test and retest scores for all the four scales had an acceptable agreement. The results of the Bland Altman plot obtained in the current study was comparable to the past study<sup>28</sup>. The visual interpretation of the JCQ domain plots were differing in both the studies. Example, the Bland Altman plot for decision latitude in the current study showed an equal distribution for both test and retest scores. However, the visual interpretation plot of decision latitude in the previous OdaleiaBarosa et al study indicates an underestimation of informed perception in the retest<sup>28</sup>. Next, Bland Altman plot for psychological demand indicates an overestimation of informed values in retest and underestimation of retest for work related social support in the current study. Nevertheless, in the Odaleia Barbosa et al study, the plot for work related social support and psychological demand showed a vice versa results<sup>28</sup>. The variations of the results might be due to the differences of time interval between application of test and retest among the two studies. In the current study, a one week interval of time period was used between collection of first and second measures, whereas the past study used a period of two weeks of time period to measure the agreement between two measures<sup>28</sup>. The current study used one week interval of time to minimize any changes in the working environment of the linemen. Moreover, any changes in the workload and the relationship between coworkers during the longer time interval may affect the psychological aspects of the workers which might influence the performance of M-JCQ. The comparison for JCQ score via Bland Altman plot was unable due to scarcity of the studies in analyzing the scale via this method.

A major limitation of the current study was the smaller number of sample size. Nevertheless, an additional reliability measures such as Bland

Altman plot were used in this study in order to strengthen the reliability testing process. The reliability reported in the current study is related only to specific population of interest in the area of electrical industries. Hence, the application of the M-JCQ to other working populations may alter the repeatability and in such cases the reliability should be examined separately. However the procedure to measure the test reliability of M-JCQ proposed in this study may serve as guide for clinicians and researchers in their future research related to the electricity linemen population.

## CONCLUSION

The current study identified that the Malay version of Job Content Questionnaire [M-JCQ] demonstrated a good test retest reliability and agreement in the assessment of the work related psychosocial risk factors among electricity linemen.

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## SUPPLEMENTARY MATERIALS

The supplementary materials such as raw data and particulars of the participants will be provided upon request to the authors of this script. These information will be maintained by the researchers for a period of five years as per the standards of good clinical practice

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