

ORIGINAL ARTICLE

**CROSS-SECTIONAL STUDY ASSESSING FACTORS ASSOCIATED WITH PERCEIVED DENIAL AMONG POST-MYOCARDIAL INFARCTION SURVIVORS IN A MALAYSIAN CARDIAC HEALTH FACILITY**

*Kurubaran Ganasegeran<sup>1,2\*</sup>, Abdul Rashid<sup>1</sup>*

<sup>1\*</sup> Department of Public Health Medicine, RCSI-UCD Malaysia Campus, Penang, Malaysia, <sup>2</sup> Clinical Research Center, Seberang Jaya Hospital, Ministry of Health Malaysia, Jalan Tun Hussein Onn, Penang, Malaysia.

**Abstract**

**Objectives:** The aim of this study was to determine the factors associated with perceived denial among post-myocardial infarction (post-MI) survivors in Malaysia. **Methods:** This descriptive-analytical single-hospital cross-sectional study was conducted between July and September 2016 among 201 post-MI survivors aged between 24 and 96 years old at the outpatient cardiac clinic in a Malaysian public hospital. A self-administered questionnaire that consisted of the validated 8-items Verbal Denial of Myocardial Infarction Questionnaire, and items on socio-demographic, health attributes and social support characteristics based on the OSLO-3 Social Support Scale (OSS-3) was utilized. Descriptive, bivariate and multivariate analyses were conducted. **Results:** The average total score of perceived denial in post-MI survivors was 22.1 (SD ± 6.1) and ranged between 8 and 37. At multivariate level, greater denial score was more prevalent in singles, those with time-to-event of ≤ 1 year, those sustained arrhythmias, those who perceived good health, and those received a lot of other people's concern. These associations were statistically significant (p<0.05). **Conclusion:** Perceived denial was significantly associated with socio-demographics, health attributes and social support in post-MI survivors. Early screening is crucial to prompt primary caregivers to initiate potential coping mechanisms for better prognosis and improved quality of life.

**Keywords:** Denial, Myocardial infarction, Social support, Health, Demographics, Malaysia

**Introduction**

Doctor-patient communications during medical encounters are often concluded when a clinician sets the stage to convey information about the patient's medical condition [1]. Such a situation in a closed consultation room is often appraised as stressful, elevating substantial anxiety and depression among patients due to the emotional shock of the diagnosis [1]. This crucial environment demands appropriate defense mechanisms for patients to assimilate and accommodate the reality of the disease within one's life [2]. The survival of chronic life-threatening illnesses like myocardial infarction and its' subsequent prognosis is highly dependent on the strength and extent of an appropriate defense mechanism [3]. When this mechanism collapses, patients' are subjected to greater challenges of survival, elevating disease mortality and morbidity rates [3].

Unexpected demands to accept and adopt the current state of one's cardiac health condition may be challenged either consciously or unconsciously in an attempt to control elevated levels of stress and fear, pretending that such illnesses are non-existent [4]. This behavioral action, collectively termed as "denial" is justified by the psychoanalytical theory which postulates that intra-psychic defense strategy within human's locus of control mediate an equilibrium to

ally one's perceived "dangers" of current health condition into an acceptable, adaptive real-life reality [5]. Freud in 1961 succinctly conceptualized denial as "a defense mechanism to reduce the threatened effect of the feared reality" [6].

The psychological notion of denial has been investigated broadly in patients with both congenital<sup>3</sup> and acquired cardiac disease [7-10]. However, its' conceptualization remains elusive due to its intensification with mixed and conflicting perspectives, clinical strategies and empirical findings within the cardiac literature [11]. Gentry and Froese reported lower anxiety levels in deniers compared to non-deniers noting their persistence of such defensiveness throughout the hospital stay [12,13].

Extensive literature that examined the associations between denial and psychosocial factors found that denial reduced psychological distress among survivors of cardiac ailments and increased satisfaction with life [14]. Deniers were found to be more symptom-free and adaptive to current life adjustments, exhibited lesser mood disturbances to rehabilitation programs, better social support with less marital conflicts and positive effect on survival lower psychological and emotional distress less chaotic lives such as fewer problems related to work, sex life and performance of

physical activities more adaptive physiological functioning indices and better survival prognosis [15-22].

Hackett and colleagues found a lower mortality rate in post-myocardial infarction patients expressing denial; they observed four deaths in depressed and anxious patients with myocardial infarction but none in deniers [23]. However, a subsequent investigation by Havok and Maryland showed that denial was related to increased mortality at a later course of survival. Results of this study suggest that although denial may improve patient-perceived health in the short term, it has greater negative implications for patient health in the long term [20].

Cardiovascular diseases (CVDs) cause unprecedented mortality and disabilities worldwide, with resource-poor and middle-income countries suffering the bulk of the total CVD epidemic. As the prevalence of myocardial infarction in Malaysia is high and its' related complications topped the nation's mortality rate, deteriorating mental health outcomes from survivors of chronic life-threatening diseases are projected to show a commensurate increase within the next decade [24]. Although prevalence data are sparse denial is felt to be fairly common among cardiovascular disease patients [11]. It was noted that initial literature that highlighted denial with its roots in psychoanalytical theory, showed conflicting findings which is challenged by current psycho-analytical researchers who believe that such findings were immature or primitive as the mechanisms that exhibited temporality between denial and life-threatening ailments were much related to personality disorders [25]. As a modern medical practice that emphasizes medication adherence and rehabilitation of aftercare may be hindered with denial in post-myocardial infarction survivors for improved prognosis the current study aims to explore potential factors affecting perceived denial in a sample of post-myocardial infarction survivors in Malaysia [10,26].

## **Method**

### ***Study design and sample***

This descriptive-analytical single-hospital cross-sectional study was conducted between July and September 2016 amongst 201 post-myocardial infarction survivors at the Cardiology Outpatient Clinic of Serdang Hospital, Malaysia. Serdang Hospital is one of the two premier cardiac referral centers within Peninsular Malaysia (apart from the National Heart Institute in Kuala Lumpur) that shares an equal burden for cardiac referral cases throughout the Peninsular [27].

### ***Sample size requirement***

With a population of over 500 post-MI survivors from Serdang Hospital between January-December 2015, a

sample size of 217 patients was calculated to allow the study to determine perceived denial with a confidence interval of  $\pm 5\%$  [28,29]. Additional 10% were included to the calculated sample to compensate for possible missing data or non-response to have a final sample size of 239 [30].

### ***Ethical approval***

This study confirmed to the guidelines convened in the Declaration of Helsinki. Ethical approval was obtained from the Medical Research Ethics Committee (MREC), Ministry of Health Malaysia (government approval number: NMRR-15-2210-28696-IIR). Study aims and objectives were explained. Respondent confidentiality, anonymity and their right to withdraw at any stage of the study were assured. Each respondent received a written description of the objectives, aims, and benefits of the study along with the study questionnaires in a sealed envelope. Written consent was obtained from those who agreed to participate.

### ***Procedure***

Participants for the study sample were recruited through systematic sampling via intervals of three patients during myocardial infarction clinic days. Patients diagnosed with myocardial infarction by a physician as documented in medical records, those aged 18 years or older and discharged from the hospital of at least one-month post-MI were included in the study. Cognitively impaired patients, those under psychiatric follow-up or unable to read or comprehend in Malay were excluded from the study.

### ***Measures***

A self-administered questionnaire that consisted of four parts was developed in Malay from available literature and validated scales.

The first part consisted of items on socio-demographic variables (gender, age, marital status, education level, household income, and current employment status).

Health attributes were evaluated in the second part. Perceived general health status was assessed using a single validated item "How would you rate your current health status?" with five response options, from poor (5), fair (4), good (3), very good (2), excellent (1) [31]. These items were reversed and dichotomized as good (1-3) and poor (4-5), consistent with previously reported scoring rule [32]. Disease comorbidities (diabetes, hypertension or hypercholesterolemia) were derived from patient medical records. Baseline clinical parameters adopted were as follows: (1) Patients with fasting plasma glucose level of 7 mmol/L (126 mg/dL) or above and prescribed with oral hypoglycemic agents or insulin regimen as documented in medical records were classified as having diabetes; (2) Patients were hypertensive if they were previously diagnosed with

hypertension and administered with anti-hypertensives as documented in medical records; (3) Hypercholesterolemia was defined as total cholesterol more than 5.2 mmol/L with high plasma triglyceride concentration (>1.7mmol/L), low high-density lipoprotein cholesterol concentration (<1.0 mmol/L for men; <1.3 mmol/L for women) and increased concentration of low-density lipoprotein cholesterol (>2.6 mmol/L with cardiac risk factors) with patients currently on statins as documented in medical records [33,34]. With regards to disease complications: (1) Patients whose MI progressed to heart failure-these were based on failure symptoms, chest radiography and echocardiography findings as documented in medical records; (2) Patients whose MI progressed to arrhythmias-the diagnosis was based on irregular heartbeat and abnormal electrocardiogram findings as documented by a physician in patient medical records [35].

The three items OSLO-3 Social Support Scale (OSS-3) to evaluate the patient’s perceived social support was administered in the third part [36]. This brief measure which can be used as an item-by-item scale measures three main aspects of social support: number of people the respondents feel close to (structural support), the interest and concern shown by others (emotional support) and the ease of obtaining practical help from others (practical support) [37]. The total score was calculated by adding up the raw scores for each item. The sum of raw scores has a range from 3-14 (score 3-8 classified as poor support; score 9-11 classified as intermediate support; score 12-14 classified as a strong support) [37]. As we intend to determine the association of denial across the three individual items in the OSS-3 as well, we coded each item into three categories according to a recent study recommendation to ease interpretation [38].

The main outcome measure that evaluated perceived denial of myocardial infarction was assessed in the final part. The validated 8-items Verbal Denial in Myocardial Infarction Questionnaire was utilized in this study [8]. The eight-item scale consisted of the following items: “I feel that all the fuss about my myocardial infarction is rather exaggerated”; “Deep inside, I’m not really convinced that I have had a myocardial infarction”; “Even though I now and then have felt pain or discomfort in the chest, this isn’t anything to worry about”; “I don’t spend much time thinking about the possibility of a new myocardial infarction”; “It takes me more than a myocardial infarction to make me fall apart”; “I have not been the

least anxious during my hospitalization”; “I try to forget everything about my heart disease”; and “The less you think about your illness, the better!” These items were rated on a five-point Likert scale ranging from “disagree completely” to “agree completely”. Scoring of the total scale was performed by summing the item responses such that higher scores indicated greater denial [39].

**Statistical Analyses**

The analysis was performed using IBM SPSS Version 23.0 statistical software. Descriptive analysis was performed for all variables in this study. Cronbach’s alpha was used to test the internal consistency of the Verbal Denial in Myocardial Infarction Questionnaire if suitable for the current study population. Continuous variables and total denial score were expressed in mean and standard deviations (SDs). Student T-test and Analysis of Variance (ANOVA) were applied to compare perceived denial score with socio-demographics, health attributes, and social support. In the case of ANOVA, post-hoc Bonferroni test was determine where the statistically significant difference was.

We maintained the primary outcome measure as a continuous variable in determining bivariate associations to ensure more power to the results without deliberately discarding data via categorization of variables that could alarm false positives [40,41]. Multiple linear regression analysis using “backward elimination” technique was employed to obtain significant factors associated with perceived denial among post-MI survivors. The accepted level of statistical significance was set below 5% (P<0.05). Multicollinearity was checked between independent variables.

**Result**

***Socio-demographic characteristics of the respondents***

The data of 201 respondents (84% response rate) were included in the final analysis (thirty-eight questionnaires were excluded due to missing data and non-response). The sample constituted of 171 (85.1%) men and 30 (14.9%) women. The mean age was 55 years (SD ± 10) and the age ranged between 24 and 96 years. Most respondents were married 170 (84.6%), attained secondary education or higher 119 (59.2%), with a monthly household income between MYR 1001-3000 124 (61.7%). The majority of the respondents were currently unemployed 109 (54.2%) (Table 1).

**Table 1. Socio-demographic characteristics (n=201).**

Characteristics	Frequency (N)	Percentage (%)
<b>Gender</b>		
Men	171	85.1
Women	30	14.9
<b>Age (years)</b>		
18-59	132	65.7

≥ 60	69	34.3
<b>Marital status</b>		
Single	8	4.0
Married	170	84.6
Divorced/Separated/Widowed	23	11.4
<b>Education level</b>		
Less than secondary	82	40.8
Secondary or higher	119	59.2
<b>Household income (MYR)</b>		
≤ 1000	38	18.9
1001-3000	124	61.7
≥ 3001	39	19.4
<b>Current employment status</b>		
Employed	92	45.8
Unemployed	109	54.2

**Health characteristics and social support of the respondents**

Most respondents perceived good health status 148 (73.6%). The majority were diagnosed with MI more than a year ago 110 (54.7%). Twenty-eight patients (13.9%) had their MI progressed to heart failure while 9 (4.5%) patients sustained arrhythmias. Of the total post-MI patients, 128 (63.7%) patients had two or more co-morbid conditions; 92 (45.8%) suffered

diabetes, 136 (67.7%) had hypertension and 134 (66.7%) were diagnosed with hypercholesterolemia. With regards to social support, most respondents had very easy or easy access to instrumental social support 102 (50.7%). Majority 85 (42.3%) of the respondents perceived a lot of concern from others while 89 (44.3%) respondents had two or fewer persons to count on in times of trouble. The bulk of respondents had poor social support 157 (78.1%) (Table 2).

**Table 2. Health characteristics and social support (n=201).**

Characteristics	Frequency (N)	Percentage (%)
<b>Perceived general health status</b>		
Good	148	73.6
Poor	53	26.4
<b>Time-to-event</b>		
≤ 1 year	91	45.3
>1 year	110	54.7
<b>MI progressed to heart failure</b>		
No	173	86.1
Yes	28	13.9
<b>MI progressed to arrhythmias</b>		
No	192	95.5
Yes	9	4.5
<b>Have diabetes</b>		
No	109	54.2
Yes	92	45.8
<b>Have hypertension</b>		
No	65	32.3
Yes	136	67.7
<b>Have hypercholesterolemia</b>		
No	67	33.3
Yes	134	66.7
<b>No. of co-morbidities</b>		
<2	73	36.3
≥ 2	128	63.7
<b>Instrumental social support</b>		
Very easy/easy	102	50.7
Possible	59	29.4
Difficult	40	19.9
<b>Other people's concern</b>		
A lot	85	42.3
Some	71	35.3

None/little/uncertain	45	22.4
<b>People to count on</b>		
None/1-2 people	89	44.3
3-5 people	72	35.8
>5 people	40	19.9
<b>Perceived social support</b>		
Poor support	157	78.1
Intermediate support	37	18.4
Strong support	7	3.5

**The “deniers”**

Cronbach’s alpha coefficient for the Verbal Denial in Myocardial Infarction Questionnaire was 0.70, suggesting that the scale has an acceptable internal consistency in the current study population. The mean total score of perceived denial for all respondents was 22.1 (SD ± 6.1) and the scores ranged from 8 to 37. Mean with (SD) total score of perceived denial of myocardial infarction was compared across the categorical variables in this study.

**Association between socio-demographics and perceived denial**

Table 3 shows the association between perceived denial and socio-demographic characteristics. A statistically significant association was observed between perceived denial and marital status (p=0.004); post-hoc tests showed that singles exhibited greater denial (27.0 ± 4.0) in comparison to those divorced, separated or widowed (19.1 ± 6.2, p=0.004). Patients attained lesser than a secondary education had greater denial score (22.8 ± 6.1) compared to those attained secondary education or higher (20.9 ± 6.0, p=0.030).

**Table 3. Association between socio-demographics and perceived denial of myocardial infarction (n=201).**

Characteristics	Perceived denial of myocardial infarction	
	Mean (SD)	P-value
<b>Gender</b>		
Men	22.1 (5.9)	
Women	22.2 (7.0)	0.904
<b>Age (years)</b>		
18-59	21.8 (6.2)	
≥ 60	22.2 (6.0)	0.705
<b>Marital status</b>		
Single	27.0 (4.0)	
Married	22.3 (5.9)	
Divorced/Separated/ Widowed	19.1 (6.2)	0.004
<b>Education level</b>		
Less than secondary	22.8 (6.1)	
Secondary or higher	20.9 (6.0)	0.030
<b>Household income (MYR)</b>		
≤ 1000	20.8 (5.5)	
1001-3000	22.0 (6.3)	
≥ 3001	24.3 (5.3)	0.040
<b>Current employment status</b>		
Employed	22.0 (5.6)	
Unemployed	22.2 (6.5)	0.870

A statistically significant association was observed between perceived denial and monthly household income (p=0.040); post-hoc tests showed that those with a household income of MYR 3001 or more exhibited greater denial (24.3 ± 5.3) in comparison to those with a household income of MYR 1000 or less (20.8 ± 5.5, p=0.036).

**Association between health characteristics, social support, and perceived denial**

Table 4 shows the association between health characteristics, social support and perceived denial of myocardial infarction. Patients who perceived good health status had higher denial score (23.0 ± 5.9) compared to those with poor health status (19.7± 6.4, p<0.001). Those with time-to-event of MI of one year or less had higher denial score (23.0 ± 6.1) compared to those more than a year (21.2 ± 6.0, p=0.036). Patients whose MI progressed to arrhythmias had greater denial score (22.3 ± 5.9) compared to those who did not (16.3 ± 5.5, p=0.006).

**Table 4. Association between health characteristics, social support and perceived denial of myocardial infarction (n=201).**

Characteristics	Perceived denial of myocardial infarction	
	Mean (SD)	P-value
<b>Perceived general health status</b>		
Good	23.0 (5.9)	
Poor	19.7 (6.4)	<0.001
<b>Time-to-event</b>		
≤ 1 year	23.0 (6.1)	
>1 year	21.2 (6.0)	0.036
<b>MI progressed to heart failure</b>		
No	22.0 (6.1)	
Yes	22.4 (6.5)	0.764
<b>MI progressed to arrhythmias</b>		
No	16.3 (5.5)	
Yes	22.3 (5.9)	0.006
<b>No. of co-morbidities</b>		
<2	21.8 (6.0)	
≥ 2	22.3 (6.1)	0.549
<b>Instrumental social support</b>		
Very easy/easy	22.3 (6.2)	
Possible	22.1 (5.8)	
Difficult	21.2 (6.0)	0.615
<b>Other people's concern</b>		
A lot	22.9 (5.9)	
Some	22.3 (6.0)	
None/little/uncertain	19.9 (6.1)	0.032
<b>People to count on</b>		
None/1-2 people	21.9 (5.8)	
3-5	21.8 (5.9)	
>5	22.8 (6.8)	0.663
<b>Perceived social support</b>		
Poor support	22.7 (5.9)	
Intermediate support	20.3 (6.5)	
Strong support	19.0 (5.4)	0.039

A statistically significant association was observed between perceived denial and other people's concern (p=0.032); post-hoc tests showed that those who received a lot of concern exhibited greater denial (22.9 ± 5.9) in comparison to those who received none, a little or uncertain concern by others (19.9 ± 6.1, p=0.030). Although a statistically significant association was observed between perceived denial and social support (p=0.039); post-hoc test failed to show where the significant difference was (Table 4).

**Factors associated with perceived denial by multiple linear regression analyses**

Table 5 exhibits the factors associated with perceived denial by multiple linear regression analysis. Singles had on the average 6.4 (95% CI 1.7 to 11.1) greater denial score in comparison to those divorced,

separated or widowed (p=0.007). Patients with time-to-event of MI one year or less had on the average 1.6 (95% CI 0.1 to 3.2) higher denial score in comparison to those diagnosed more than a year (p=0.047). Patients' who's MI progressed to arrhythmias had on the average 4.0 (95% CI 0.1 to 7.9) higher denial score compared to those who don't (p=0.040). Those who perceived good health status had on the average 2.7 (95% CI 0.2 to 4.5) greater denial score in comparison to those who perceived poor health status (p=0.005). Patients who received a lot of people's concern had on the average 2.4 (95% CI 0.2 to 4.5) higher denial score in comparison to those who received none, little or uncertain concern (p=0.034). The total model was significant (p<0.001) and accounted for 18% of the variance. There was no multicollinearity between variables.

**Table 5. Results of multiple linear regression (backward elimination), factors associated with perceived denial among post-MI survivors.**

Factors	Perceived denial in post-MI survivors					
	B	SE	Beta	P-value	95% CI	
					Lower	Upper
Marital status (Single)	6.4	2.4	0.2	0.007	1.7	11.1
Marital status (Married)	2.5	1.3	0.2	0.052	0.1	5.0
Time-to-event $\leq$ 1 year	1.6	0.8	0.1	0.047	0.1	3.2
MI progressed to arrhythmias	4.0	1.9	0.1	0.040	0.1	7.9
Perceived good general health	2.7	0.9	0.2	0.005	0.2	4.5
Other people's concern (A lot)	2.4	1.1	0.2	0.034	0.2	4.5
Other people's concern (Some)	1.9	1.1	0.2	0.090	0.3	4.2

**Notes:**

- The reference group for marital status is “divorced/separated/widowed”; for time-to-event is “>1 year”; for MI progressed to arrhythmias is “No”; for perceived general health status is “poor”; for other people’s concern is “none/little/uncertain”
- B: unstandardized coefficients, SE: standard error, Beta: standardized coefficients, CI: confidence intervals
- Variables entered: All significant variables in the univariate analyses

**Discussion**

In this observational study, we attempted to explore possible associations between socio-demographic, health attributes and social-support characteristics with perceived denial in a sample of post-MI survivors in Malaysia. To our knowledge, this is the first attempt that explored denial among post-MI survivors in Asia, especially from the Malaysian perspective. Literature which explored denial in adults requiring cardiac care mainly focused on communities across countries from the Western counterparts, and these findings were relatively non-convincing based on the context within which it was anchored (either for personal, interpersonal, or medical use) and duration of which it was utilized (either before, during, or after a traumatic event) [11]. The findings showed mixed interpretations for researchers and clinicians to reach an acceptable conclusion for daily practice [11]. Despite uncertainties on how likely denial would influence the survival and prognosis of post-MI patients, the approach executed in the current study found some logical interpretations of the factors yielded from our final regression model; being single, time-to-event of MI of a year or less, those sustained arrhythmias, perceived good general health status and concerns showed by others all of which showed greater denial amongst post-MI survivors.

The current study found greater denial among post-MI survivors across two diverge extent; the first at an early phase of the disease whereby survivors time-to-event MI was one year or less, exhibited greater denial; the second, at the later stage of the disease on which those diagnosed with MI had their disease progressed to further complications like arrhythmias showed higher denial score. The plausibility of such situations could be justified by the intriguing theory proposed by Lazarus in 1983 [42]. He viewed denial as ‘constructive’ at an early phase of the disease to overcome the emotional shock of the diagnosis but found it ‘destructive’ at a later course of disease

progression when active coping was needed. Fowers [9] supported this notion. He argued that at an early stage of an illness, denial was perceived as a coping mechanism to allay anxiety in cardiac patients, but over time these mechanisms collapse, implicating poor knowledge of cardiac disease progression and outcomes, delay in seeking treatment and not being adherent to prescribed medications.

General health perception has been widely accepted as generically important behavioral outcomes construct [43]. The Self-Regulation Model (SRM) of health and illness postulates that patients’ who construct their own health representations help them to have a sense of their individual experiences which provides a basis for their own coping mechanisms [44]. We found that denial was significantly associated with better general health perceptions in our study sample. This finding was consistent with previous studies that established associations between denial with decreased anxiety and stress among patients with acquired cardiac disease and congenital heart disease [39,45]. It is plausible that such situations could be attributed when survivors of MI have accustomed themselves to receiving negative health information over time, thus perceiving themselves to be particularly resilient as they have overcome the high odds of negative consequences of survival during the course of their disease [3].

Having fragmented or fragile social support networks inhibits fundamental coping mechanisms to overcome unexpected psychosocial repercussions like chronic stress, accumulation of unpredicted life events, depression, anxiety, social isolation and withdrawal [46,47]. Our multivariate analysis showed that the association between poor social support and denial could not be considered as an independent association in this study, therefore adding an interaction without the main effect could not be considered. The statistically significant association found in the

bivariate analyses may be a confounded association due to the coherence between variables, concern showed by others and marital status (a common proxy to social support). We found that singles and those received a lot of concern from others exhibited greater denial in our study sample. Hackett and Cassem found similar consistencies [48]. Our plausible explanations to these associations could be inter-related. The current study sample was constituted of mainly younger aged men who could have been engaged in larger social networks through the emergence of cyber-technology that offers virtual interconnectedness through online social networking activities, thus facilitating greater social support. However, such large social networks may lead to broadly perceived emotional concerns (liking, love, empathy) being showed by family members, friends, co-workers, and community resources to provide post-MI survivors a sense of intimacy, belonging, social interaction, an opportunity for nurturance, confidence and tangible support. Connotations like “nothing is wrong!” “cheer up!” “all are fine!” which enhances personal identity, a sense of security, worthiness, and importance may subsequently lead to negative consequences like the decline of promoting rehabilitation health within the social network, motivating post-MI survivors to perceive greater denial states without acknowledging the consequences of the disease progression [48,49].

The limitations of this study should be acknowledged. Firstly, the cross-sectional nature of the current study could not establish temporality between covariates. Secondly, the relatively small sample size from a single hospital and the demographics of our population (majority men, younger age group, well-educated) limits the generalizability of the study findings. Thirdly, the small sample size of our study population may have increased the possibility of a type II error in this analysis, for example, married people might have achieved statistical significance in the multivariate model with a larger population ( $p=0.052$ ). Fourthly, although our primary outcome measure was new from the Malaysian setting, certain variables that were hypothesized to be associated with perceived denial were not proven, thus eliminated in our regression model. Robust methodological study designs such as prospective cohorts are warranted to determine temporality between covariates which are left open for further thoughts and hypotheses in future studies.

### **Conclusion**

Perceived denial was associated with demographic (marital status), health characteristics (general health status; time-to-event, sustaining arrhythmias) and social support factors. Identifying denial among survivors at an early stage is crucial to prompt caregivers to initiate potential life coping skills to prevent disease progression and improve prognosis.

### **Acknowledgment**

This study was conducted within the Ministry of Health Malaysia facility. We thank the Director

General of Health Malaysia for permissions to publish the research findings. We thank Dr. Kamaraj Selvaraj (Deputy Head of Department, Hospital Serdang) for his support and approval to conduct the study. We also thank the Clinical Research Center (CRC) Klang of Tengku Ampuan Rahimah Hospital for their support in completing this study.

### **Author Contributions**

Kurubaran Ganasegeran contributed to the study design, recruitment of the participants, data analysis, interpretation of data, and writing of the manuscript. Abdul Rashid contributed to interpretation of data and revised the final draft critically for important intellectual content. Both authors approved the final manuscript.

### **References**

1. Ganasegeran K, Al-Dubai SAR. Medical professionalism from a socio-cultural perspective: Evaluating medical residents' communicative attitudes during the medical encounter in Malaysia. *J Postgrad Med.* 2014;60:12-15.
2. Hackett TP, Weissman NH. Denial as a factor in patients with heart disease and cancer, care of the patients with the fatal illness. *Ann NY Acad Sci.* 1967;164:802-817.
3. White KS, Pardue C, Ludbrook P, et al. Cardiac denial and psychological predictors of cardiac care adherence in adults with congenital heart disease. *Behav Modif.* 2016;40:29-50.
4. Cousins N. Denial: Are sharper definitions needed? *JAMA.* 1982;248:210-212.
5. Folks DG, Freeman AM, Sokol RS, et al. Denial: Predictor of outcome following coronary bypass surgery. *Int J Psychiatry Med.* 1989;18:57-66.
6. Freud A. *The ego and the mechanisms of defense.* Hogarth: London. 1961.
7. Soloff PH. Denial and rehabilitation of the post-infarction patient. *Int J Psychiatry Med.* 1977;8: 125-132.
8. Havik OE, Maeland JG. Dimensions of verbal denial in myocardial infarction. *Scand J Psychol.* 1986;27:326-339.
9. Fowers BJ. The cardiac denial of impact scale: A brief, self-report research measure. *J Psychosom Res.* 1992;36:469-475.
10. Stenstrom U, Nilsson A, Stridh C. Denial in patients with a first-time myocardial infarction: relations to pre-hospital delay and attendance to a cardiac rehabilitation programme. *Eur J Cardiovasc Prev Rehabil.* 2005;12:568-571.
11. Livneh H. Denial of chronic illness and disability -Part I: Theoretical, functional, and dynamic perspectives. *Rehabil Couns Bull.* 2009;52:225-236.
12. Gentry WD, Foster S, Haney T. Denial as a determinant of anxiety and perceived health status



- in the coronary care unit. *Psychosom Med.* 1972;34:39-44.
13. Froese A, Hackett TP, Cassem NH, et al. Galvanic skin potential as a predictor of mental status, anxiety, depression, and denial in acute coronary patients. *J Psychosom Res.* 1975;19:1-9.
  14. Livneh H. Denial of chronic illness and disability -Part II: Research findings, measurement considerations, and clinical aspects. *Rehabil Couns Bull.* 2009;53:44-45.
  15. Radley A, Green R. Styles of adjustment to coronary graft surgery. *Soc Sci Med.* 1985;20:461-472.
  16. Soloff PH, Bartel AG. Effects of denial on mood and performance in cardiovascular rehabilitation. *J Chronic Dis.* 1979;32:307-313.
  17. Soloff PH. Effects of denial on mood, compliance, and quality of functioning after cardiovascular rehabilitation. *Gen Hosp Psychiatry.* 1980;2:134-140.
  18. Buetow S, Goodyear-Smith F, Coster G. Coping strategies in the self-management of chronic heart failure. *Fam Pract.* 2001;18:117-122.
  19. Croog SH, Shapiro DS, Levine S. Denial among male heart patients. *Psychosom Med.* 1971;33:385-397.
  20. Havik OE, Maeland JG. Verbal denial and outcome in myocardial infarction patients. *J Psychosom Res.* 1988;32:145-157.
  21. Warrenburg S, Levine J, Schwartz GE. Defensive coping and blood pressure reactivity in medical patients. *J Behav Med.* 1989;12:407-424.
  22. Prince R, Frasure-Smith N, Rolicz-Woloszyk E. Life stress, denial, and outcome in ischemic heart disease patients. *J Psychosom Res.* 1982;26:23-31.
  23. Hackett TP, Cassem NH, Wishnie HA. The coronary care unit: an appraisal of its psychological hazards. *N Engl J Med.* 1968;279:1365-1370.
  24. Institute for Public Health (IPH). National Health and Morbidity Survey 2015 (NHMS 2015), Vol. II (2016) Non-Communicable Diseases, Risk Factors, and other health problems.
  25. Salander P, Windahl G. Does "denial" really cover our everyday experiences in clinical oncology? A critical view from a psychoanalytic perspective on the use of "denial." *Br J Med Psychol.* 1999;72:267-279.
  26. Ganasegeran K, Rashid A. The prevalence of medication non-adherence in post-myocardial infarction survivors and its perceived barriers and psychological correlates: a cross-sectional study in a cardiac health facility in Malaysia. *Patient Prefer Adherence.* 2017;11:1975-1985.
  27. Ministry of Health Malaysia. 2017.
  28. Selangor State Health Department, Ministry of Health Malaysia. 2016.
  29. Rashid A, Conroy R, Ahmad Z. *I Hate Statistics!* IBS. 2012.
  30. Naing L, Winn T, Rusli BN. Practical issues in calculating the sample size for prevalence studies. *Archives of Orofacial Sciences.* 2006;1:9-14.
  31. Fernandez BR, Rosero-Bixby L, Koivumaa-Honkanen H. Effects of self-rated health and self-rated economic situation on depressed mood via life satisfaction among older adults in Costa Rica. *J Aging Health.* 2016;28:225-243.
  32. Zajacova A, Dowd JB. Reliability of self-rated health in US adults. *Am J Epidemiol.* 2011;174:977-983.
  33. Ganasegeran K, Ranganathan P, Manaf RA, et al. Factors associated with anxiety and depression among type 2 diabetes outpatients in Malaysia: a descriptive cross-sectional single-center study. *BMJ Open.* 2014;4:e004794.
  34. Clinical Practice Guidelines (CPG), Management of Dyslipidaemia, Ministry of Health Malaysia. 2011.
  35. Clinical Practice Guidelines (CPG) Management of Acute ST-Segment Elevation Myocardial Infarction (STEMI), Ministry of Health Malaysia. 2014.
  36. Dalgard OS. A randomized controlled trial of a psycho-educational group program for unipolar depression in adults in Norway (NCT00319540). *Clin Pract Epidemiol Ment Health.* 2006;2:15.
  37. Dalgard OS, Dowrick C, Lehtinen V, et al. Negative life events, social support and gender difference in depression: A multinational community survey with data from the ODIN study. *Soc Psychiatry Psychiatr Epidemiol.* 2006;41:444-451.
  38. Abiola T, Udofia O, Zakari M. Psychometric properties of the 3-Item Oslo Social Support Scale among clinical students of Bayero University Kano, Nigeria. *Malay J Psych.* 2013;22:1-10.
  39. Esteve LG, Valdes M, Riesco N, et al. Denial mechanisms in myocardial infarction: Their relations with psychological variables and short-term outcome. *J Psychosom Res.* 1992;36:491-496.
  40. Naggara O, Raymond J, Guilbert F, et al. Analysis by categorizing or dichotomizing continuous variables is inadvisable: an example from the natural history of unruptured aneurysms. *Am J Neuroradiol.* 2011;32:437-440.
  41. Bennet C, Vickers A. Against quantiles: categorization of continuous variables in epidemiologic research and its Discontents. *BMC Med Res Methodol.* 2012;12:21.

42. Lazarus RS. The costs and benefits of denial. In S. Breznitz (Ed.), *The denial of stress*, New York: International Universities Press. 1983;1-30.
43. Hagger MS, Orbell S. A meta-analytic review of the common-sense model of illness representations. *Psychol Health*. 2003;18:141-184.
44. Leventhal H, Diefenbach M, Leventhal E. Illness cognition: Using common sense to understand treatment adherence and affect cognition interactions. *Cognit Ther Res*. 1992;16:143-163.
45. Dimsdale JE, Hackett TP. Effect of denial on cardiac health and psychological assessment. *Am J Psychiatry*. 1982;139:1477-1480.
46. Salminen-Tuomaala M, Astedt-Kurki P, Rekiaro M, et al. Coping experiences: a pathway towards different coping orientations four and twelve months after myocardial infarction-a grounded theory approach. *Nurs Res Pract*. 2012.
47. Garcia RP, Budo MLD, Schwartz E, et al. Social support towards the necessity of caring about myocardial infarction. *Rev Bras Enferm*. 2015;68:564-570.
48. Hackett TP, Cassem NH. Development of a quantitative rating scale to assess denial. *J Psychosom Res*. 1974;18:93-100.
49. Dracup K. Cardiac rehabilitation the role of social support in recovery and compliance. Springer 1994:333-355.

**Corresponding author:** *Kurubaran Ganasegeran, Department of Public Health Medicine, RCSI-UD Malaysia Campus, Penang, Malaysia*

**E-mail:** medkuru@yahoo.com

**Received:** 28 June 2018

**Accepted:** 9 November 2018

**Published:** 24 January 2019

**Cite this article as:** Ganasegeran K, Rashid A (2019) Cross-sectional study assessing factors associated with perceived denial among post-myocardial infarction survivors in a Malaysian cardiac health facility. *ASEAN Journal of Psychiatry* 20: 2231-7805.