THE ASSOCIATION OF PSYCHOSOCIAL HEALTH WITH METABOLIC SYNDROME AMONG SCHOOL TEACHERS IN THE STATE OF MALACCA

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Abstract

Background: Metabolic syndrome (MS) is a major public health challenge worldwide. The risks of MS and chronic diseases are further escalated with the increasing burden of psychological health. This was a cross-sectional study aimed to investigate the relationship between socio-demographic, lifestyle and psychological factors and MS, as well as the independent relationship between social support and MS among school teachers in Malaysia.

Methodology: Multi-stage sampling was used to recruit participants from the state of Malacca, Malaysia. Data on socio-demographics, lifestyle factors and psychological health were obtained using self-administered questionnaires, including Short-form International Physical Activity Questionnaire (IPAQ), Depression, Anxiety and Stress Scale (DASS-21), Job content questionnaire (JCQ) and the revised 8-item Malay version of the Multidimensional Scale Perceived Social Support (MSPSS-M). Anthropometric measurements and metabolic risk assessment were conducted. Univariate analysis followed by multiple logistic regressions was conducted using complex sample logistic regression analysis.

Results: Of 1511 participants, the prevalence of MS was 23.3% (95% CI: 20.7, 26.1). MS was significantly associated with increasing age, male gender, Indian ethnicity, usage of saturated fats, lesser sleeping duration, job strain, iso-strain, and lower perceived social support. After adjusting for potential confounders, higher perceived social support from family, friends or both were significantly associated with the lower likelihood of MS by 4% (OR 0.96; 95% CI: 0.93, 0.98), 10% (OR 0.90; 95% CI: 0.85, 0.96) and 4% (OR 0.96; 95% CI: 0.94, 0.98), respectively.

Conclusion: Metabolic syndrome was associated with increasing age, male gender, Indian ethnicity, usage of saturated fats and lesser sleeping duration in our population. Psychological health such as job strain, iso strain as well as low social support may be modifiable risk factors for MS.

Keywords: Malaysia, Metabolic Syndrome, Social Support, Teachers

Introduction

Metabolic syndrome (MS) is a clustering of cardio-metabolic risk factors. Individuals with MS are at 5-fold increase in the risk of diabetes, 2-fold increase in the risk of cardiovascular diseases (CVDs) and mortality (1). The global prevalence of MS is estimated to be about one quarter of the world adult population (2). In Malaysia, MS affects up to 43.4% of its multi-ethnic population, higher than the Western population and other Asian countries (3).

The development of MS is complex and multifactorial and has been attributed to various mechanisms such as insulin resistance, adipose tissue dysfunction, oxidative stress, chronic inflammation and gut microbiota (4). Demographic and lifestyle factors are known major risk factors of MS, including genetic factors, increasing age, overweight and obesity, excess caloric intake, physical inactivity and smoking habits (4). Comparing different ethnic groups, risk of MS was found to be higher in Hispanics, South Asians and East Asians (5). In Malaysia, Indian ethnicity had the highest risk of MS, followed by Malays and Chinese (6).

Furthermore, psychological health such as job strain is associated with MS (7, 8). Job strain due to the combination

of high demands and low job control over demands placed on workers may trigger psychosocial stress. Stress stimulates cortisol release from hypothalamic-pituitary-adrenal axis, increases blood pressure and heart rate and activates autonomic nervous system, leading to insulin resistance and abdominal obesity and subsequently MS (9). Some studies also reported that social support was associated with MS (10, 11). Social support is support accessible to an individual through social ties to other individuals, groups and the larger community in provision of psychological and material resources. Social ties may stimulate healthy behaviours that prevent the onset of illness, delayed its progression and improve recovery (12).

There is cultural difference in the relationship of social support with MS. For instance, Japanese male workers with higher social support appeared to engage in alcohol drinking and higher fat intake which led to increased risk of MS (13). This finding points out that association between social support and MS may not be similar across cultures and countries. Hence, studies in different cultures are necessary to provide insights into the ties between social support and MS. Moreover, studies that examined the various aspects of social supports among Asian working population were scarce. Teachers were selected as the study participants in this study as they are one of the largest occupational groups throughout the world (14). Their physical and psychosocial health plays an important role in the education system of the country. Therefore, this study aimed to explore the association of socio-demographic, lifestyle as well as psychological factors with MS and to investigate the relationship between perceived social support and MS among teachers in Malaysia.

Materials and Methods

Study design & sampling method

This was a cross-sectional study conducted in public secondary schools in the state of Malacca, Malaysia. This is a sub-study of the CLUSTer cohort study (15). Multi-stage sampling was carried out. All public secondary schools (n=62) in Malacca were invited to participate in the study. All permanent teachers from the consented schools were invited to participate. Participants who were pregnant or had psychiatric illnesses were excluded. Ethics approval was obtained from the University of Malaya Medical Ethics Committee (MEC 950.1) and the Medical Research and Ethics Committee of Ministry of Health (NMRR-13-645-15611). Permissions were also obtained from the Ministry of Education, the Department of Education of Malacca and all participated schools. Informed consent was obtained from all participants prior to data collection.

Data collection

Data were collected from October 2013 until February 2014. Information on socio-demographic characteristics (age, gender, ethnicity, marital status, level of education, family history of diabetes, hypertension, or both), lifestyle behaviours (smoking status, physical activity, sitting time (hour/day), serving of fruits and vegetables per day, use of saturated fat in cooking, alcohol consumption and sleep duration (hour/day) and psychological health (job demand, job control, job strain, iso-strain, stress level, perceived social support at workplace and perceived social support from family or friends or both) were obtained using self-administered questionnaires in the Malay language. Anthropometric measurements and metabolic risk assessment were conducted by trained research assistants following standardised protocol. Participants' systolic and diastolic blood pressure were measured once on the left arm in a sitting position using a validated oscillometric blood pressure monitor (Omron HEM 907, Japan) following a rest of 10 minutes (16). All biochemical analyses (fasting blood glucose, fasting lipid profile and renal function test) were conducted by the Clinical Diagnostic Laboratory of University of Malaya Medical Centre. Fasting blood glucose, fasting lipid profile and renal function tests were analysed using the Dimension® clinical chemistry system which is an in-vitro diagnostic test (17).

Definition of metabolic syndrome

Metabolic syndrome was defined using the Harmonization criteria (18) as having any three or more of the following risk factors: (1) central obesity (waist circumference [WC] ≥80 cm in women or ≥90 cm in men); (2) elevated triglyceride (TG ≥1.7 mmol/L); (3) low high-density lipoprotein cholesterol (HDL-C ≤1.3 mmol/L in women or ≤1.0 mmol/L in men); (4) high blood pressure (BP ≥130/85 mmHg or on antihypertensive treatment); and (5) high fasting blood glucose (FBG ≥5.6 mmol/L or on treatment for elevated glucose).

Study instruments

Study instruments used for data collection were as the following:

I. Short-form International Physical Activity Questionnaire (IPAQ)

The short-form IPAQ was a domain-based instrument (with seven items) used to collect information on physical activity. It is a self-reported questionnaire that reports the duration of different levels of activities for the past one week or for the usual week. The validated short form IPAQ in Malay language was used and demonstrated good reliability (19). This instrument classifies study population into three groups with low, moderate and high level of physical activities based on metabolic equivalent of task (MET), in which the following MET values were used: walking= 3.3 MS, moderate activity= 4.0 MS, and vigorous activity= 8.0 MS. The MET-minutes per week (MET-min week−1) was calculated as follows: minutes of activity/day × days per week × MET level, according to the scoring protocol on the IPAQ Web site guidelines (20).

II. Depression, anxiety and stress scale (DASS-21)

The DASS-21 which consists of depression, anxiety and stress items were used to measure the levels of distress

among the participants. It was translated and validated in Malay language (18). In this study, only the stress component was used. The scores were computed and two categories namely (a) normal and mild stress and (b) moderate to extremely severe stress were used.

III. Job content questionnaire (JCQ)

The JCQ questionnaire consists of three domains with 22 core items which include demand latitude (DL), psychological job demand (PJD) and social support (SS) from co-workers and supervisors; and was validated locally (21). It was used to gather information on job strain, iso-strain and perceived social support from co-workers and supervisors at the workplace setting.

Job strain was derived from the median split of job demand and control, where job strain was composed of high demand and low control (22). Social support from co-workers and supervisors was categorized into high and low, similarly based on median split. If the participants scored below the median on the total social support scale, they were assigned to iso-strain (8). Iso-strain is defined as job strain plus low social support at work (23).

IV. Revised 8-item Malay version of the Multidimensional Scale Perceived Social Support (MSPSS-M)

The Malay version of Multidimensional Scale of Perceived Social Support 8 (MSPSS-M-8) is an 8-item questionnaire translated, adapted and validated (24), from the 12-item MSPSS. It has a 7-point scale (from 1= strongly disagree to 7= strongly agree) measuring two sources of support, namely family and friends (24). The score of family subscale ranges from 5 to 35, while the score of friends subscale ranges from 3 to 21. Total score ranges from 8 to 56. Higher score indicates greater social support.

From the validation study conducted locally (24), MSPSS-M-8 is found to have good model of fit with adequate divergent and convergent validity. It has also demonstrated excellent psychosomatic properties with Cronbach's alpha of 0.91, 0.93 and 0.920; and test-retest reliability with intraclass correlation of 0.89, 0.88 and 0.88 in the total score, family and friends subscale, respectively.

Data analysis

All statistical analyses were undertaken using the IBM SPSS version 22.0 (IBM Corp, Armonk, NY, USA). Categorical variables were presented as frequencies and percentage while quantitative variables were presented as mean ± standard deviation (SD) or median ± range as appropriate. Multiple logistic regression was conducted using complex sample logistic regression analysis. Odds ratio (OR) with 95% confidence interval (CI) were reported. Significant level was pre-set at 0.05.

Results

Fifty-one out of 62 schools (response rate= 82.3%) with a total of 1511 out of 5011 (36%) teachers participated in the analysis. The socio-demographic characteristics of participants are shown in Table 1. The mean age (±standard deviation) of participants were 42.3 years (±9.14) and more than one-third of them were aged between 40-49 years old. Majority of the participants were females (77.9%), married (84.5%) and had a degree in education (87.5%). Up to three-quarter of them were of Malay ethnicity, followed by Chinese (19.4%), Indians (3.7%) and others (1.6%). Overall, the prevalence of MS was 23.3% (95% CI: 20.7, 26.1). Among different ethnic population, Indians had the highest prevalence of MS (40.2%), followed by Malays (24.0%) and others (21.5%). Chinese had the lowest prevalence of MS (17.3%).

Table 1: Socio-demographics of study participants and its associations with metabolic syndrome

Characteristics	Total, n (%)	Metabolic syndrome		OR (95% CI)
		Yes, n (%)	No, n (%)	
All	1511	367 (23.3)	1144 (76.7)	-
Age, years, mean (±SD)	42.32 (±9.14)	-	-	-
Age, years (n=1511)				
20 - 29	148 (10.2)	14 (10.9)	134 (89.1)	1
30 - 39	411 (26.8)	67 (16.3)	344 (83.7)	1.59 (0.87, 2.91)
40 - 49	569 (36.9)	155 (24.7)	414 (75.3)	2.69 (1.30, 5.58)
50 - 59	383 (26.1)	131 (33.2)	252 (66.8)	4.08 (2.05, 8.13)
Gender (n=1511)				
Female	1162 (77.9)	256 (21.0)	906 (79.0)	1
Male	349 (22.1)	111 (31.3)	238 (68.7)	1.71 (1.26, 2.34)
Ethnicity (n=1511)				
Chinese	245 (19.4)	44 (17.3)	201 (82.7)	1
Malay	1189 (75.3)	295 (24.0)	894 (76.0)	1.51 (1.03, 2.24)
Indian	55 (3.7)	22 (40.2)	33 (59.8)	3.21 (1.55, 6.64)
Others	22 (1.6)	6 (21.5)	16 (78.5)	1.31 (0.39, 4.41)
Marital status (n=1336)				
Single	166 (13.1)	28 (16.2)	138 (83.8)	1
Married	1153 (84.5)	286 (23.4)	867 (76.6)	1.58 (0.95, 2.63)
Divorced and widowed	34 (2.4)	9 (29.5)	25 (70.5)	2.16 (0.80, 5.82)
Level of education (n=1344)				
Degree	1169 (87.5)	320 (22.9)	1016 (77.1)	1
Diploma	51 (3.7)	12 (28.9)	39 (71.1)	1.37 (0.57, 3.33)
Master/ PhD	124 (8.8)	35 (25.6)	89 (74.4)	1.16 (0.70, 1.92)
Family history (n=1351)				
Diabetes mellitus				
- No	704 (53.0)	162 (21.1)	542 (78.9)	1
- Yes	647 (47.0)	163 (24.8)	484 (75.2)	1.23 (0.85, 1.80)
Hypertension				
- No	658 (37.4)	116 (21.1)	542 (78.9)	1
- Yes	843 (62.6)	209 (23.1)	634 (76.9)	1.05 (0.73, 1.50)
Diabetes & hypertension				
- No	1178 (87.2)	276 (22.3)	902 (77.7)	1
- Yes	173 (12.8)	49 (26.9)	124 (73.1)	1.28 (0.81, 2.03)

OR: odds ratio; CI: confidence interval; n (%): number (weighted percentage)

Metabolic syndrome and socio-demographics

The odds of MS increased significantly with age and it increased by more than two to four folds among those who were in their forties and fifties respectively. MS was also significantly higher among males (31.0%) as compared to females (21.0%). The Indians were three times (OR 3.21; 95% CI: 1.55, 6.64) more likely to develop MS as compared to the Chinese. There was no statistical significance observed for marital status, level of education, and family history of diabetes or hypertension or both (Table 1).

Metabolic syndrome and lifestyle factors

There were no significant associations between smoking status, physical activity levels, sitting time, fruits and vegetables consumption and alcohol consumption with MS (Table 2). Usage of saturated fat in cooking (such as butter, ghee, animal fat and coconut milk) significantly increased the odds of MS by up to 34% (OR: 1.34; 95% CI: 1.01, 1.79). Adults with less than seven hours of sleep duration (OR 1.46; 95% CI: 1.13, 1.89) were also more likely to be associated with MS.

Table 2: Participants' lifestyle factors and its associations with metabolic syndrome

Characteristics	Total, n (%)	Metabolic syndrome		OR (95% CI)
		Yes, n (%)	No, n (%)	
Smoking status (n=1323)				
Never	1237 (93.9)	290 (22.6)	947 (77.4)	1
Smoker	33 (2.6)	12 (31.4)	21 (68.6)	1.57 (0.59, 4.14)
Ex-smoker	53 (3.5)	16 (27.0)	37 (73.0)	1.26 (0.63, 2.56)
Physical activity (n=1065)				
Low	141 (13.5)	41 (24.0)	100 (76.0)	1
Moderate	583 (55.2)	131 (21.5)	452 (78.5)	0.87 (0.57, 1.32)
High	341 (31.3)	93 (26.8)	248 (73.2)	1.16 (0.72, 1.88)
Sitting time, hour/day (n=788)				
≤ 1.6	197 (23.9)	43 (21.1)	154 (78.9)	1
1.6 - 3.9	322 (39.3)	79 (25.3)	243 (76.5)	1.15 (0.70, 2.39)
≥ 4.0	269 (36.9)	73 (25.7)	196 (74.3)	1.29 (0.66, 2.00)
Fruits and vegetables, serving/day (n=1293)				
Inadequate < 5	1241 (96.3)	291 (22.2)	950 (77.8)	1
Adequate ≥ 5	52 (3.7)	16 (27.3)	36 (72.7)	1.32 (0.69, 2.53)
Saturated fat used in cooking (n=1348)				
No	559 (44.3)	117 (19.9)	440 (80.1)	1
Yes	789 (55.7)	206 (25.0)	585 (75.0)	1.34 (1.01, 1.79)
Alcohol consumption (n=1355)				
No	1318 (96.2)	311 (22.4)	1007 (77.6)	1
Yes	38 (3.8)	12 (31.0)	25 (69.0)	1.56 (0.66, 3.70)
Sleep duration, hour/day (n=1306)				
Normal (7 – 9)	464 (37.6)	94 (18.3)	370 (81.7)	1
Short (<7)	842 (62.4)	214 (24.7)	628 (75.3)	1.46 (1.13, 1.89)

OR: odds ratio; CI: confidence interval; n (%): number (weighted percentage)

Metabolic syndrome and psychological health

Participants with job strain (high job demand and low job control) had significantly higher proportion of MS (30.7% vs 22.5%) compared to those without job strain. Iso-strain (job strain with low perceived social support from co-workers and supervisors) significantly increased the proportion of MS from 22.1% to 41.2%. Perceived social support from co-workers and supervisors was not significantly associated with MS. Stress was also not associated with MS.

Higher perceived social support from family and friends significantly reduced the odds of MS by 5% and 12% respectively. When both perceived social support from family and friends were combined, the odds of MS were attenuated to 4% (OR 0.96; 95% CI: 0.94, 0.98) (Table 3).

Table 3. Participants' psychological health and its association with metabolic syndrome

Characteristics	Total n (%)	Metabolic syndrome		OR (95% CI)	Adjusted OR (95% CI)#
		Yes, n (%)	No, n (%)		
Job demand (n=1424)					
Low	733 (51.2)	173 (23.1)	560 (76.9)	1	
High	691 (48.8)	190 (25.8)	501 (74.2)	1.16 (0.86, 1.56)	
Job control (n=1424)					
Low	617 (44.2)	172 (25.2)	445 (74.8)	1	
High	807 (55.8)	191 (23.7)	616 (76.3)	0.92 (0.70, 1.21)	
Job strain (n=1424)					
No	1109 (77.2)	258 (22.5)	851 (77.5)	1	
Yes	315 (22.8)	105 (30.7)	210 (69.3)	1.53 (1.18, 1.98)	
Iso-strain (n=1424)					
No	1253 (87.8)	294 (22.1)	959 (77.9)	1	
Yes	171 (12.2)	69 (41.2)	102 (58.8)	2.47 (1.70, 3.60)	
Moderate to severe stress (n=1344)					
No	1253 (81.2)	295 (22.5)	958 (77.5)	1	
Yes	91 (7.3)	26 (25.2)	65 (74.8)	1.16 (0.62, 2.18)	
Perceived social support from co-workers and supervisors (n=1424)					
Low	419 (29.8)	121 (27.7)	298 (72.3)	1	
High	1005 (70.2)	240 (22.9)	763 (77.1)	0.77 (0.54, 1.11)	
Perceived social support (n=1333)	Median (range)	Median (range)	Median (range)		
Family	29 (5-105)	28 (5-35)	30 (5-105)	0.95 (0.93, 0.98)	0.96 (0.93, 0.98)
Friends	15 (3-24)	15 (3-21)	15 (5-24)	0.88 (0.84, 0.93)	0.90 (0.85, 0.96)
Both	45 (8-125)	43 (8-56)	46 (11-125)	0.96 (0.94, 0.98)	0.96 (0.94, 0.98)

OR: odds ratio; CI: confidence interval; n (%): number (weighted percentage)
#Adjusted for age, gender, ethnicity, lifestyle factors (usage of saturated fat in cooking, sleep duration), psychosocial factors (job strain, iso-strain, social support at workplace)

Multivariate analysis

Multivariate analysis was carried out to determine the relationship between perceived social support from family and friends (Table 3) with MS. After adjusting for potential confounders (age, gender, ethnicity, lifestyle factors such

as usage of saturated fat in cooking, sleep duration; psychosocial factors: job strain, iso-strain), higher perceived social support from family and friends were significantly associated with the lower likelihood of MS by 4% (OR 0.96; 95% CI 0.93, 0.98) and 10% (OR 0.90; 95% CI: 0.85, 0.96) respectively. Overall, higher perceived social support from both family and friends combined were significantly associated with reduced odds of MS by 4% (OR 0.96; 95% CI: 0.94, 0.98).

Discussion

The overall prevalence of MS in the current study was lower than two previous nationwide studies, which were 42.5% and 27.5% respectively (6, 25), using the same Harmonised definition. This could be due to "healthy worker effect" as individuals who work tend to be healthier than those who do not work. In addition, our participants were relatively younger (less than 60 years old) than the above-mentioned study populations.

According to the third National Health and Nutrition Examination Survey (NHNES), the prevalence of MS increased from 6.7% in individuals aged 20-29 to 43.5% and 42.0% in individuals aged 60-69 and aged at least 70 respectively (26). Similar trend was demonstrated in our working population in which approximately 10% and one-third of participants aged 20-29 and 50-59 had MS respectively. Besides, our study showed that men had significantly higher prevalence of MS when compared to their counterpart (31% vs 21%). This is in consistent with the phenomenon of gender-related disparity demonstrated in the prevalence of MS in previous literature. Among the younger age group, men tend to show higher prevalence of MS than women, with opposite trend reported among older population (27, 28). This could be explained by the gender difference in MS associated risk factors whereby men exhibit higher risks of hypertension, diabetes and hypertriglyceridemia, however, lower risks of high waist circumference and low high-density lipoprotein (28).

Participants of Indian ethnicity had significantly higher odds of MS than other ethnic groups, consistent with previous findings (3,25). Ethnic Indians, particularly of South Asian origin are predisposed to metabolic disturbances such as abdominal obesity, glucose intolerance, hypertension and dyslipidaemia (29). On the contrary, ethnic Chinese had the lowest prevalence of MS, likely to be attributed to ethno-cultural related factors such as lifestyle practices and dietary pattern (6, 25).

A recent study revealed that the lowest risk of MS was observed in people sleeping seven hours per night and lack of sleep is associated with poor cardiometabolic outcomes (30). Inadequate sleep stimulates pro-inflammatory cytokines and sympathetic activity, which in turn leading to insulin resistance (30). Besides, the largest pulse release of growth hormone and growth hormone releasing hormone, which are essential in fat burning and general repair and regeneration are suppressed by delayed onset of sleep after midnight (30). Similarly, our study population with shorter sleeping duration of less than seven hours had increased risk of MS.

Apart from sleep duration, usage of saturated fats rendered our participants higher risk of MS. Limiting the intake of saturated fats and replacing with unsaturated fats was associated with risk reduction of CVD events (31). International dietary guidelines from the American Heart Association/ American College of Cardiology (AHA/ACC) and World Health Organisation (WHO) also advocate a limited consumption of total saturated fats to reduce negative impact on cardiometabolic health (32, 33).

High job strain was linked to individual components of MS or MS (34, 35), diabetes and CVDs (36) in prospective studies. Increase in activation of autonomic nervous system and secretion of cortisol as a result of prolonged exposure to stressors at works have been associated with higher BMI, blood pressure, LDL and lower HDL (34). The proportion of job strain in our study was similar with other studies, ranging from 20.2% to 33.3% among secondary school teachers and other professions (37, 38). Job strain among our participants who were teachers may be contributed by heavy workload, constant evaluation on students' work and high expectation from society on teachers. Job strain was associated with MS in the univariate analysis but became insignificant in the multivariate model. Healthy worker effect may have attenuated the association between job strain and MS in the present study, in which teachers with poor health may have opted to leave the profession or retire early. In addition, those leaving behind probably had good coping skills to handle with the stressful working environment.

The proportion of our participants with iso-strain was 12.2%, comparable with the employees in Western world which ranged from 10.0 to 17.0% (23, 39). Iso-strain was reported to increase the odds of metabolic syndrome (7, 8, 23). In the current study, iso-strain was significantly associated with MS in the univariate analysis but not significant in the multivariate analysis. It is possible that iso-strain may only increase the odds of MS after longer exposure to work stress with low social support. Therefore, a prospective study design would be more appropriate in investigating the association between iso-strain and MS.

Our study demonstrated that perceived social support from either family or friends or both were independently associated with decreased odds of MS after adjusted for potential confounders. Similar findings were reported in Sweden (40) and USA (11). Individuals with higher perceived social support may have higher self-esteem, self-control, and social skill, which may lead to better proactive coping mechanism (41), healthy behavioural choices (42) and adherence with medical regimens (43). On the contrary, the lack of perceived social support is often associated with unhealthy lifestyle such as poor diet, smoking and sedentary lifestyle (44). We did not find perceived social support from co-workers and supervisors to be associated with MS, as reported elsewhere. However, Hwang & Lee, 2014 found lack of social support from co-

workers and supervisors increased the odds of MS by 51% among Korean blue-collar workers (45). These different findings could be due to the different nature of work at the workplace settings and cultural practices among different study populations.

To the best of our knowledge, evidence of the association between social support and MS remains scarce and the present study maybe the first to demonstrate a significant association between high social support and lowered odds of MS using the validated MSPSS-M among Malaysian working population. Our results provide additional evidence into the relationship between perceived social support (family and friends) and MS from the East. Our study also highlights that high job strain and iso-strain among working adults are associated with risk of MS. Findings from our study will now inform future policies to revise working hours and performance indicators that are currently being set by the Ministry of Education Malaysia. However, our study is limited by its cross-sectional design, which causal relationship cannot be established. The findings may not be generalised to other occupational groups in Malaysia. Future studies of prospective design with different occupational groups should be carried out.

Conclusion

Increasing age, being male, Indian ethnicity, usage of saturated fats and inadequate sleep were linked to increased risk of MS. Psychological health such as job strain, iso-strain and perceived social support from either family or friends or both predispose our teachers to risk of MS. Perceived social support from family or friends or both was independent predictor of MS. Future intervention programs should incorporate social support as one of the targeted factors in addition to the conventional lifestyle and biological factors.

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Conflict of Interest

All authors had no conflict of interest to declare.

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