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Original Article

EXPLORING THE RELATIONSHIP BETWEEN CARDIOMETABOLIC RISK FACTORS AND PSYCHOLOGICAL WELL-BEING IN SEDENTARY OLDER MEN

EXPLORANDO A RELAÇÃO ENTRE FATORES DE RISCO CARDIOMETABÓLICOS E BEM-ESTAR PSICOLÓGICO EM HOMENS IDOSOS SEDENTÁRIOS

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RESUMO
Estilos de vida sedentários afetam negativamente a saúde física e mental de idosos, aumentando o risco de distúrbios cardiometabólicos e sofrimento psicológico. Na Caxemira, uma região do subcontinente indiano, as tensões sociopolíticas e o isolamento geográfico agravam ainda mais esses riscos. Este estudo examina a relação entre indicadores cardiometabólicos (por exemplo, índice de massa corporal (IMC), percentual de gordura corporal (PGC), relação cintura-quadril (RCQ), pressão arterial sistólica e diastólica (PAS, PAD), frequência cardíaca em repouso (FCR), taxa metabólica basal (TMB)) e bem-estar psicológico (medido pelo estresse percebido e satisfação com a vida) em 160 homens sedentários com idades entre 60 e 70 anos. Dados antropométricos e fisiológicos foram coletados usando protocolos padrão, e o bem-estar psicológico foi avaliado usando a escala de estresse percebido (ESP) e a escala de satisfação com a vida (ESV). Correlações de Pearson revelaram associações positivas entre fatores de risco cardiometabólicos (p. ex., IMC, %G, PAS, RCE) e estresse percebido, e correlações negativas com satisfação com a vida. A análise de regressão múltipla mostrou que, embora o modelo para estresse percebido tenha sido significativo (p = 0,005), os preditores individuais não o foram (p > 0,05). Para satisfação com a vida, o modelo foi significativo (p = 0,000), com RCE identificada como um preditor negativo significativo (p = 0,024), enquanto os preditores individuais não foram significativos (p > 0,05). Esses achados sugerem que os riscos cardiometabólicos estão associados ao aumento do estresse e à menor satisfação com a vida em homens idosos sedentários na Caxemira, destacando a necessidade de intervenções que promovam atividade física e estilos de vida mais saudáveis.
Palavras-chave: risco cardiometabólico. estilo de vida sedentário. estresse percebido. satisfação com a vida. obesidade central.

ABSTRACT
Sedentary lifestyles negatively affect the physical and mental health of older adults, increasing their risk for cardiometabolic disorders and psychological distress. In Kashmir, a region of the Indian subcontinent, socio-political tensions and geographic isolation further exacerbate these risks. This study examines the relationship between cardiometabolic indicators (e.g., body mass index (BMI), body fat percentage (BFP), waist-to-hip ratio (WHR), systolic and diastolic blood pressure (SBP, DBP), resting heart rate (RHR), basal metabolic rate (BMR)) and psychological well-being (measured by perceived stress and life satisfaction) in 160 sedentary men aged 60-70 years. Anthropometric and physiological data were collected using standard protocols, and psychological well-being was assessed using the perceived stress scale (PSS) and life satisfaction scale (LSS). Pearson correlations revealed positive associations between cardiometabolic risk factors (e.g., BMI, BFP, SBP, WHtR) and perceived stress, and negative correlations with life satisfaction. Multiple regression analysis showed that while the model for perceived stress was significant (p = .005), individual predictors were not (p > .05). For life satisfaction, the model was significant (p = .000), with WHtR identified as a significant negative predictor (p = .024), while individual predictors were not significant (p > .05). These findings suggest that cardiometabolic risks are linked to increased stress and lower life satisfaction in sedentary older men in Kashmir, highlighting the need for interventions promoting physical activity and healthier lifestyles.
Keywords: cardiometabolic risk. sedentary lifestyle. perceived stress.life satisfaction.central obesity.

Introduction

Sedentary lifestyles are increasingly prevalent among older adults, significantly impacting both their physical and mental health outcomes. According to Park et al.[1], sedentary behavior is recognized as a significant global contributor to a number of health diseases, such as diabetes, musculoskeletal issues, depression, hypertension, and cardiovascular ailments. The World Health Organization[2] estimates that 3.2 million fatalities per year are related to insufficient physical exercise, and sedentary lifestyles are a major contributing factor to these deaths. Older adults are particularly vulnerable to the adverse effects of sedentary lifestyles due to age-related physiological changes that exacerbate the consequences of physical inactivity[3]. The Sedentary Behaviour Research Network[4] describes the sedentary behavior as any waking activity that uses 1.5 or fewer metabolic equivalents of energy, including activities like sitting, reclining, and other forms of prolonged inactivity.

Prolonged periods of inactivity have been closely linked to various cardiometabolic disturbances. Insufficient regular exercise can lead to metabolic dysfunctions, such as raised blood pressure, dyslipidemia as well as impaired insulin resistance, increasing the chance of type II diabetes and cardiovascular diseases[5,6]. Studies also indicate that Inactivity is one of the primary factors that lead to the onset of obesity, further heightening cardiometabolic risks. Long periods of sitting have been linked to higher body fat percentages, broader waist circumferences, and increased body mass—all of which are important markers of obesity[7,8]. Obesity, in turn, is a well-established contributor to cardiometabolic risks, including hypertension, dyslipidemia, and insulin resistance[9]. Furthermore, prolonged sitting has been linked with raised waist-to-hip ratio as well as an elevated resting heart rate, both of which are additional risk factors for cardiometabolic conditions[10].

Apart from its physical health impacts, a sedentary lifestyle also poses significant psychological risks. Sedentary behavior has been linked to increased prevalence of mental health problems, such as anxiety and depression and a lower level of overall life satisfaction[11]. Physically inactive individuals are more susceptible to developing psychological disorders compared to those who engage in regular physical activity[12]. These psychological effects are particularly concerning for older adults, as sedentary behavior can worsen stress, exacerbate mood disorders, and further diminish life satisfaction[13]. Therefore, addressing inactivity is essential for all of our mental and physical health, regardless of age.

Aging is associated with a higher possibility of developing multiple chronic health conditions, a phenomenon known as multimorbidity. This term denotes the coexistence of more than one chronic illness, a situation that is becoming increasingly prevalent worldwide, particularly in aging populations[14]. The World Health Organization[15], states that there are serious issues facing global healthcare systems as a result of the increased frequency of multimorbidity among older persons. This trend is concerning in South Asia especially among the low and middle income nations, where estimates of multimorbidity prevalence range from 4.5% to 83%[16]. Rapid demographic shifts in these regions have led to a growing proportion of elderly individuals, making multimorbidity a critical public health concern.Research consistently shows that individuals with multimorbidityhave a higher chance of experiencing adverse health effects, such as a higher death rate, elevated depression rates and a reduced standard of living[17]. Those living with multimorbidities are at a greater risk of depressive symptoms compared to individuals without chronic illnesses[18].

In India alone, approximately 46 million people suffer from depression, with the burden disproportionately affecting older adults and contributing significantly to disability-adjusted life years[19]. Depression symptoms are especially common in those with long-term health issues such as diabetes, renal illness, cardiovascular disease and hypertension[20]. It has been underlined that, in comparison to the general population, those with cardiovascular disorders are more likely to experience depression[21]. Moreover, long-term health diseases such as diabetes, renal disease, cancer, and lung disease have been found to be significant risk factors for mental health problems[22-24]. Addressing mental health in patients with chronic illnesses is therefore essential to improving their overall quality of life.

This study focuses on sedentary older men aged 60 to 70 years in Kashmir, the northernmost region of the Indian subcontinent, where older adults face unique socio-cultural and environmental challenges. Due to its socio-political tensions and geographical isolation, Kashmir creates a distinct environment where older adults may be more susceptible to the coupled effects of psychological stress and inactivity. The study aims to explore the complex relationship between key cardiometabolic risk factors, such as waist-to-hip ratio, body fat percentage, BMI, blood pressure, heart rate, and psychological well-being—in this population. By investigating the health outcomes of sedentary older men in Kashmir, the research is to offer insightful information into the associations between sedentary behavior, cardiometabolic risks, and psychological well-being. Addressing the dual burden of multimorbidity and psychological stress in this demographic is essential to enhancing their general well-being. This study intends to shed light on these issues and contribute to developing effective strategies to support this vulnerable group.

Methods

Study Participants

The study involved a sample of 160 senior citizens aged 60 to 70 years residing in various regions of Kashmir, India. A purposive sampling technique was utilized to ensure a representative sample of age group 60-70 years. Sedentary behavior was operationally defined as engaging in sitting or reclining activities for six or more hours per day and participating in less than 30 minutes of moderate-to-vigorous physical activity (MVPA) daily, based on self-report. This classification was made using a brief lifestyle activity questionnaire adapted from the Sedentary Behavior Questionnaire (SBQ), which included items on occupational sitting, leisure screen time, and transportation habits[25]. The adapted questionnaire was pilot-tested for clarity among a small subsample (n=10), with items tailored to reflect local lifestyle patterns. Participants were classified as sedentary if their total sitting time exceeded 6 hours per day and they reported less than 30 minutes of MVPA on most days, aligning with WHO guidelines[26]. Daily physical activity was assessed through self-reported duration and type of moderate-to-vigorous activities, such as walking, household chores, or exercise, during a typical week. Eligible individuals included shopkeepers and retired professionals whose daily routines involved prolonged sitting and minimal physical exertion. Exclusion criteria included individuals with recent surgeries, chronic illnesses, or ailments include cardiovascular disease and diabetes that could affect the anthropometric indices and health markers being measured. All participants received written informed consent before taking part.

Study Organization and Data Collection

Assessments were carried out in a controlled setting to ensure consistent data collection. Calibrated equipment was employed for taking anthropometric measurements. Standing Height was determined using a stadiometer, while body weight was measured with a digital scale. Body mass index (BMI) was computed using the formula: body weight (kg) divided by standing height (m^2). Measurements of the waist circumference were made at the narrowest point on the torso, and the hip circumference at the broadest point of the hips. The waist-to-hip ratio was calculated by dividing the waist measurement by the hip measurement. Body fat percentage was evaluated with an Omron body composition analyzer. Furthermore, Omron's automated blood pressure monitor (HEM 7124) was used to record the subject's resting blood pressure and heart rate.

In addition, participants completed a brief lifestyle activity questionnaire adapted from the Sedentary Behavior Questionnaire (SBQ) under supervision. This self-administered tool captured data on average daily sitting time, occupational activity, screen-based leisure time, and transportation modes. It also included self-report items on the frequency and duration of moderate-to-vigorous physical activity (MVPA) during a typical week. These responses were used to classify participants as sedentary based on the WHO criteria of ≥6 hours sitting per day and <30 minutes of MVPA.

Life Satisfaction Scale (LSS)

The Life Satisfaction Scale (LSS) is a widely used tool for measuring an individual's overall life satisfaction[27]. There are 5 items that assess cognitive judgments about life satisfaction, allowing participants to evaluate their life as a whole rather than focusing on specific domains. Likert scale responses are provided on a 7-point scale, with total scores that range from 5 to 35.A score of 20 indicates a neutral position, whereas higher scores indicate higher levels of life satisfaction.

Perceived Stress Scale (PSS)

According to Cohen et al.[28], the Perceived Stress Scale (PSS) is a psychological tool for assessing perceived stress. It evaluates how unpredictable, uncontrollable, and overwhelming individuals perceive their lives to be. The PSS consists of 10 items on a 5-point rating scale, and higher scores indicate higher levels of perceived stress. This scale helps clarify the connection between stress levels and health outcomes within the study population.

Statistical Analysis

Data analysis was conducted using SPSS software version 25 for Windows. For every variable, descriptive statistics like means and standard deviations were computed. The correlation coefficient between the variables was examined using Pearson's method. Multiple linear regression analysis was then conducted, with life satisfaction scale and perceived stress scale as the dependent variables, and the anthropometric indices and physiological measurements as the independent variables. This allowed for the assessment of how the independent variables influenced the dependent variables. A significance level of 0.05 was set for all statistical tests to ensure the reliability of the results.

Results

Descriptive statistics were calculated for key cardiometabolic risk factors and psychological measures. The sample consisted of 160 sedentary older men. Table 1 below summarizes the means and standard deviations for each variable.

Table 1. Descriptive statistics of cardiometabolic risk factors and psychological measures

Variables	Sedentary Older Men (n=160)	
	M	SD
Body Mass Index	25.93	3.43
Body Fat Percentage (%)	27.57	4.88
Resting Systolic BP (mmHg)	139.75	10.08
Resting Diastolic BP (mmHg)	96.26	7.22
Resting Heart Rate (bm^{-1})	81.43	3.69
Waist Circumference (cm)	91.53	8.12
Hip Circumference (cm)	92.86	10.23
Waist-to-Hip Ratio	1.00	0.20
Basal Metabolic Rate	1516.52	173.81
Waist-to-Height Ratio	0.54	0.05
Perceived Stress Scale	23.13	7.63
Life Satisfaction Scale	20.10	5.26

Note: M = Mean; SD = Standard deviation; % =Percentage; BP = Blood pressure; mmHg=Millimeters of mercury; bm^{-1}= Beats per minute; cm = Centimeter

Source: The authors

Pearson correlation coefficients (Table 2) were calculated to assess the relationships between cardiometabolic risk factors, perceived stress, and life satisfaction.

Table 2. Correlations among cardiometabolic risk factors, perceived stress, and life satisfaction

Coefficient of correlation (r)		
Cardiometabolic Risk Factors	Psychological Well-Being (n=160)	
	PSS	LSS
BMI	.317**	-.363**
BFP	.316**	-.282**
SBP	.217**	-.224**
DBP	.164*	-.202*
RHR	.112	-.127
WC	.139	-.160*
HC	.022	-.049
WHR	.134	-.143
BMR	.120	-.163*
WHtR	.206**	-.225**

Note: BMI = Body mass index; BFP = Body fat percentage; SBP = Systolic blood pressure; DBP = Diastolic blood pressure; RHR = Resting heart rate; WC= Waist circumference; HC = Hip circumference; WHR = Waist-to-hip ratio; BMR = Basal metabolic rate; WHtR = Waist-to-height ratio; PSS = Perceived stress scale; LSS = Life satisfaction scale; * = p<0.05, ** = p< 0.01
Source: The authors

To investigate the connections between perceived stress (PSS), life satisfaction (LSS), and cardiometabolic risk variables, Pearson correlation coefficients were calculated (Table 2). The results indicated that BMI exhibited a positive correlation with perceived stress ($r = .317$, $p < .01$) and showed a negative correlation with life satisfaction ($r = -.363$, $p < .01$). Body fat percentage (BFP) showed similar patterns, positively correlating with perceived stress ($r = .316$, $p < .01$) and negatively with life satisfaction ($r = -.282$, $p < .01$). Systolic blood pressure (SBP) exhibited a positive correlation with perceived stress ($r = .217$, $p < .01$) and showed a negative correlation with life satisfaction ($r = -.224$, $p < .01$). Waist-to-height ratio (WHtR) exhibited a positive correlation with perceived stress ($r = .206$, $p < .01$) and showed a negative correlation with life satisfaction ($r = -.225$, $p < .01$), while diastolic blood pressure (DBP) showed weaker but significant correlations ($r = .164$, $p < .05$ for stress and $r = -.202$, $p < .05$ for life satisfaction). Other significant correlations included waist circumference (WC) and basal metabolic rate (BMR), both negatively associated with life satisfaction ($p < .05$). Resting heart rate (RHR), hip circumference (HC), and waist-to-hip ratio (WHR) did not show significant correlations with stress or life satisfaction.

Table 3. Regression analysis summary of predictors of Perceived Stress Scale (PSS) based on cardiometabolic risk factors

Model Summary: R = .391, R^2 = .153, Adjusted R^2 = .096

ANOVA: F = 2.682, Sig. = .005

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	-3.558	25.969		-0.137	.891
	BMI	0.852	1.045	0.383	0.816	.416
	BFP	0.270	0.181	0.173	1.490	.138
	SBP	0.013	0.086	0.017	0.146	.884
	DBP	0.056	0.110	0.053	0.503	.616
	RHR	-0.115	0.181	-0.056	-0.635	.527
	WC	0.036	0.830	0.038	0.043	.966
	HC	0.258	0.234	0.346	1.102	.272
	WHR	13.216	8.616	0.344	1.534	.127
	BMR	-0.013	0.026	-0.299	-0.501	.617
	WHtR	-38.927	136.830	-0.255	-0.284	.776

Dependent Variable: Perceived Stress Scale (PSS)

Note: BMI = Body mass index; BFP = Body fat percentage; SBP = Systolic blood pressure; DBP = Diastolic blood pressure; RHR = Resting heart rate; WC = Waist circumference; HC = Hip circumference; WHR = Waist-to-hip ratio; BMR = Basal metabolic rate; WHtR = Waist-to-height ratio

Source: The authors

A linear regression analysis (Table 3) was carried out to investigate the relationship between cardiometabolic risk factors and perceived stress, as assessed by the Perceived Stress Scale (PSS). The overall model was statistically significant, F = 2.682, p = .005, with an R = .391 and an R^2 = .153, indicating that 15.3% of the variance in PSS scores can be explained by the predictor variables. However, none of the individual predictors were statistically significant ($p > .05$).

Table 4. Regression analysis summary of predictors of Life Satisfaction Scale (LSS) based on cardiometabolic risk factors

Model Summary: R = .431, R^2 = .186, Adjusted R^2 = .131						
ANOVA: F = 3.400, Sig. = .000						
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
2	(Constant)	54.659	17.554		3.114	.002
	BMI	-0.386	0.706	-0.251	-0.546	.586
	BFP	-0.073	0.123	-0.068	-0.598	.550
	SBP	0.006	0.058	0.012	0.111	.912
	DBP	-0.079	0.075	-0.108	-1.053	.294
	RHR	0.052	0.122	0.037	0.429	.668
	WC	0.368	0.561	0.568	0.656	.513
	HC	-0.291	0.158	-0.567	-1.839	.068
	WHR	-13.267	5.824	-0.500	-2.278	.024
	BMR	0.000	0.018	-0.014	-0.024	.981
	WHtR	-23.633	92.491	-0.225	-0.256	.799
Dependent Variable: Life Satisfaction Scale (LSS)						

Note: BMI = Body mass index; BFP = Body fat percentage; SBP = Systolic blood pressure; DBP = Diastolic blood pressure; RHR = Resting heart rate; WC = Waist circumference; HC = Hip circumference; WHR = Waist-to-hip ratio; BMR = Basal metabolic rate; WHtR = Waist-to-height ratio
Source: The authors

A linear regression analysis (Table 4) was carried out to investigate the relationship betweencardiometabolic risk factors and life satisfaction, as measured by the Life Satisfaction Scale (LSS). The overall model was statistically significant, F = 3.400, p = .000, with an R = .431 and an R^2 = .186, indicating that 18.6% of the variance in life satisfaction can be explained by the predictor variables. Waist-to-hip ratio was found to be a significant negative predictor of life satisfaction (β = -.500, p = .024). However, other cardiometabolic factors, were not significantly predict life satisfaction (p > .05).

Table 5. Residuals statistics for life satisfaction scale (LSS)

Statistics	n	M	SD	Min	Max
Predicted value	160	20.10	2.268	12.73	25.93
Residual	160	0.000	4.748	-8.915	14.201
Std. predicted value	160	0.000	1.000	-3.248	2.572
Std. residual	160	0.000	0.968	-1.818	2.895

Note: n = Numbers; M = Mean; SD = Standard deviation; Min = Minimum; Max = Maximum
Source: Authors

The residual statistics (Table 5) indicate that the model predictions were reasonably accurate, with no significant bias and normally distributed residuals, suggesting a good fit to the data without major outliers.

Discussion

The present study highlights the intricate link between cardiometabolic risk factors and psychological well-being among sedentary older men in Kashmir. The sample demonstrated an average body mass index of 25.93 and a body fat percentage of 27.57%, with previous research indicating a concerning prevalence of obesity and hypertension[29]. Specifically, the mean systolic blood pressure was recorded at 139.75 mmHg, while the diastolic pressure averaged 96.26 mmHg, suggesting that this demographic is at a heightened risk for cardiovascular disorders[30]. These parameters serve as critical indicators of central obesity, which is closely, associated with adverse cardiometabolic outcomes. Key risk factors include BFP, BMI, and WHR[31-33].Individuals participating in consistent physical activity seem to have lower BMI and BFP than those who are sedentary[34-36]. Regular physical activity is recommended to prevent obesity[37].The correlation analysis further elucidates these connections, revealing a strong positive relationship between BFP, BMI, blood pressure, and perceived stress (PSS). This suggests that increased adiposity may exacerbate stress levels within this group[38]. Conversely, there was a negative correlation identified between BMI and life satisfaction, indicating that higher BMIs among the peopleare likely to report lower subjective well-being[39,40].

Insights from linear regression analysis provide additional clarity on these relationships. Although BMI exhibited the strongest yet non-significant correlation with PSS, no variables reached statistical significance. This indicates that while perceived stress may be influenced by BMI, other unmeasured factors could also play a significant role[41]. The WHR underscores the detrimental impact of abdominal fat distribution on life satisfaction. This finding corroborates previous research emphasizing the role of visceral fat in deteriorating mental and physical well-being[42].While cardiometabolic variables contribute to psychological outcomes, the moderate explanatory power of the models—15.3% for PSS and 18.6% for LSS—suggests that they do not fully account for the observed variations[43,44]. This limitation underscores the necessity for more comprehensive evaluations that consider additional physiological and psychological factors.

The implications of these findings advocate for interventions targeting both psychological health and cardiometabolic risk management. The strong inverse correlation between life satisfaction and perceived stress highlights the relationship between mental and physical health in older adults[45-47]. Strategies aimed at reducing body weight and abdominal fat, alongside managing hypertension, could enhance psychosocial outcomes in addition to improving cardiometabolic profiles[48,49].

While this study provides valuable insights into the associations between cardiometabolic risk factors and psychological well-being, it is important to acknowledge the methodological limitations. Multiple linear regression was employed to examine the relationships among variables; however, the complex and potentially bidirectional interactions between cardiometabolic indicators and psychosocial outcomes may be more appropriately explored using advanced statistical approaches such as structural equation modeling (SEM) or path analysis. These techniques allow for the simultaneous examination of direct and indirect effects, mediating pathways, and latent constructs, offering a more nuanced understanding of causal relationships. Nevertheless, the current study's cross-sectional design and limited sample size posed constraints on the feasibility of such modeling. Future research incorporating larger, longitudinal samples would be better positioned to utilize these methods and uncover the underlying mechanisms linking physical and psychological health in sedentary older adults.

Moreover, although multiple linear regression was used to analyze relationships between cardiometabolic and psychological variables, the complex interplay among these factors may be better explored through advanced statistical approaches such as structural equation modeling (SEM) or path analysis. These techniques would allow for investigation of potential mediators and moderators and better assess causal pathways. Given the current study's cross-sectional design and sample size, however, such modeling was not feasible.

Future research should explore how changes in lifestyle, such increased physical exercise and dietary changes, can influence these interrelated factors, particularly in sedentary populations facing elevated cardiometabolic risks. By investigating the potential benefits of healthier lifestyle choices, interventions could be designed to mitigate both the physical and psychological impacts of obesity, hypertension, and stress in this demographic.

Conclusion

The study reveals a significant link between cardiometabolic risk factors and psychological well-being in sedentary older men in Kashmir. Elevated BMI, BFP, resting blood pressure, and WHtR were correlated with higher stress and lower life satisfaction. However, the cardiometabolic risk factors of individual predictors for perceived stress and life satisfaction were not statistically significant ($p > .05$). In order to enhance both mental and physical wellness in this vulnerable group, tailored treatments that encourage physical exercise, healthy food, and lifestyle modifications are necessary. Addressing these interconnected challenges could significantly enhance their overall quality of life, with future research focusing on effective strategies to support these lifestyle modifications.

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