

# Correlates of Functional Limitations in Midlife: A Cross-Sectional Study in Middle-Aged Men (45–59 Years) from Pune

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Submitted: 22-May-2019  
Revised: 28-Feb-2020  
Accepted: 28-Apr-2020  
Published: 29-Sep-2020

## INTRODUCTION

Functional limitation is defined as restrictions in performing vital activities of everyday life. Functional limitation is a dynamic process which gradually develops over an extended period of time, leading to difficulties in performing vital activities of daily living (ADL) effectively.<sup>[1]</sup> Functional limitation is strongly associated with reduced quality of life and an elevated risk for chronic conditions and premature death.<sup>[2,3]</sup> Research suggests that limitations in functioning begin between the ages of 40–55 years and continues in old age.<sup>[4,5]</sup> During this stage of life,

**ABSTRACT** **Background and Objective:** The present article aims to determine the correlates of functional limitation in middle-aged men (45–59 years age) in the slums of Pune, India. **Materials and Methods:** A total of 553 community-dwelling middle-aged men were randomly selected from the study area. Data on demographic characteristics, health-related conditions, and social and psychological determinants of health were collected using a pretested, structured questionnaire. Functional ability was assessed using the Pune-Functional Ability Assessment Tool. Univariate analyses and bivariate logistic regression analyses were carried out to examine the associations between various correlates and functional limitations. **Results:** A total of 55.2% of the respondents displayed functional limitations. Univariate analysis identified significant correlates of functional limitations, which were increasing age, nature of the occupation, presence of chronic diseases, self-reported aches and pains, vision problems, previous hospital admission, and stress. Binary logistic regression displayed the higher odds of having functional decline in men with age above 55 years (odds ratio [OR] = 2.592; 95% confidence interval [CI] = 1.597–4.207), unskilled occupation (OR = 1.681; 95% CI = 1.050–2.692), chronic disease (OR = 2.608; 95% CI = 1.553–4.378), and reporting aches and pains (OR = 6.605; 95% CI = 3.732–11.689) as compared to their counterparts. **Conclusion:** This study has identified the magnitude of functional decline and its risk factors for midlife men. These study findings suggest that men having several risk factors should be monitored to protect against accelerated functional loss. These findings are important because functional decline has implications on older adult's health and disease conditions. A better understanding of these factors will help to develop health promotion interventions for men in midlife.

**KEYWORDS:** Functional limitation, men health, midlife, risk factors

individuals experience social, economic, and health transition,<sup>[6]</sup> which may accelerate the process of functional decline and care demands.<sup>[7]</sup> Changes in muscle strength, presence of chronic diseases, body weight, and lack of physical activity in midlife can increase the chance of having functional decline during the later stages of life.<sup>[2–5]</sup> Difficulty in performing ADL affects nearly 15% of the middle-aged adults in

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**How to cite this article:** Nagarkar A, Gadkari R, Kulkarni S. Correlates of functional limitations in midlife: A cross-sectional study in middle-aged men (45–59 years) from Pune. J Mid-life Health 2020;11:144-8.

Access this article online	
Quick Response Code: 	Website: <a href="http://www.jmidlifehealth.org">www.jmidlifehealth.org</a>
	DOI: 10.4103/jmh.JMH_79_19

the industrialized nations.<sup>[4,5]</sup> Thus, midlife health is an important stage in life. Despite the high prevalence of functional impairment during midlife, little is known about it in low- and middle-income countries. While gender differences in the health of women and men, especially the health of women during midlife have been documented in multiple settings, the evidence on the health of midlife men has not been systematically examined. Therefore, the present study was undertaken to document the functional limitation and its correlates in community-dwelling middle-aged men.

## MATERIALS AND METHODS

### Population and sample

The sample size was calculated using the prevalence of functional limitations in middle-aged adults. Considering a 15% prevalence in Brown *et al.*<sup>[4]</sup> study, with 95% confidence interval (CI) and 0.05 precision, we obtained a sample size of 457. Considering 20% nonresponse, the sample size was calculated to be 559. Middle-aged men who were residents of the study area and who were ambulatory were included in the study. Men with an acute illness, any injury which restricted their daily activities or those recently discharged from the hospital, nonambulatory or had hearing and communication problems were excluded from the study.

### Data collection tools and techniques

A pretested, structured questionnaire including sociodemographic, health, functional decline, anthropometric measurements, and handgrip strength-related measurements was used to collect the data. Functional decline was assessed using the Pune-Functional Ability Assessment Tool (FAAT) scale.<sup>[8]</sup> Pune-FAAT scale contained ten items, and the individuals were asked to rate on a four-point Likert scale, the level of difficulty they faced when performing daily activities (no difficulty, some difficulty, most difficult, and cannot perform). These activities included lifting (3–4 kg weight), bending, squatting, walking (1–2 km), climbing stairs, rising from chair and bed, bathing, using a toilet, dressing, and eating. Individuals were instructed to rate each activity based on their level of difficulty in performance without the use of any physical aid. The presence of aches and pain was measured using the Visual Analog Scale. The individuals were asked to rate their current pain on a scale of 0–10 scores. Handgrip strength was measured using Jamar Handgrip Dynamometer. The study was approved by the Institutional Ethics Committee of the University, India. The purpose of the study was explained to the participants, and written informed consent was obtained before the data collection.

### Data analysis

The final analysis is based on 553 completed records of the middle-aged men. Baseline demographic data were analyzed using descriptive statistics. For univariate analysis, functional ability (0 = no difficulty and 1 = have difficulty) was the dependent and sociodemographic variables, health status variables, history of fall, and hospitalization, and handgrip strength were independent variables. Chi-square tests were used to test the associations between functional ability (dependent variable) and the correlates (independent variable). The variables showing significant association in the univariate analysis were pooled into the regression model, and a bivariate logistic regression analysis was conducted. Odds ratio (OR) and the corresponding 95% CIs were calculated for the bivariate logistic regression model. Statistical significance was defined as a  $P < 0.05$ . The analysis was carried out using the SPSS Statistics for Windows, Version 23.0. (Armonk, New York: IBM Corp).

## RESULTS

### Baseline demographic characteristics

The mean age of the study participants was  $51.92 \pm 4.9$  years of which 36.0% were above 55 years of age, 41.4% were illiterate, majority of them (70.2%) had an unskilled occupation, mostly married (97.6%), and the monthly family income ranged between US\$ 113.16 to US\$ 429.46. Only one-fourth (25%) respondents reported the presence of some chronic illnesses such as hypertension (8.3%) and diabetes (9.0%). Respondents also reported chest pain (2.9%), palpitation (3.3%), heart attack (2.4%) osteoarthritis (0.9%), asthma (0.7%), and thyroid (0.4%).

### Correlates of functional limitation

Impairment in ADL was reported by 58.6% of participants aged 50–54 years, and 69.8% of participants aged 55–59 years. Nearly 40% of adults between 45 and 49 years reported functional limitations. Various correlates were found to be associated with functional limitations in this study. These correlates were divided into three sets. Table 1 shows the association of sociodemographic characteristics and health-related characteristics of the respondent with functional ability. This set includes associated factors that are modifiable such as body mass index (BMI), handgrip, fall, stress, and aches and pains. BMI and handgrip were found not to be significantly associated with functional limitation. Stress was found to be significantly associated with functional limitations ( $P = 0.005$ ). The presence of aches and pains reported by 63.7% of respondents,

**Table 1: Univariate analysis showing the association of functional ability and correlates**

Variables	Functional ability		$\chi^2$	P
	No difficulty	Have difficulty		
Age (n=553), n (%)				
45-49	135 (59.7)	91 (40.3)	38.240	0.000*
50-54	53 (41.4)	75 (58.6)		
55-59	60 (30.2)	139 (69.8)		
Education				
Illiterate	103 (45.0)	126 (55.0)	1.383	0.501
Up to 10 <sup>th</sup>	107 (43.0)	142 (57.0)		
Above 10 <sup>th</sup>	38 (50.7)	37 (49.3)		
Occupation				
Skilled	88 (53.3)	77 (46.7)	6.848	0.009*
Unskilled	160 (41.2)	228 (58.8)		
Monthly income				
<10,000	96 (56.8)	73 (43.2)	17.429	0.000*
10,000-30,000	105 (36.8)	180 (63.2)		
≥30,000	47 (47.5)	52 (52.5)		
Health-related variables				
Chronic illness				
Yes	35 (25.4)	103 (74.6)	28.22	0.000*
No	213 (51.3)	202 (48.7)		
Diabetes				
Yes	7 (14.0)	43 (86.0)	21.146	0.000*
No	241 (47.9)	262 (52.1)		
Hypertension				
Yes	11 (23.9)	35 (76.1)	8.889	0.003*
No	237 (46.7)	270 (53.3)		
Aches and pains				
Yes	161 (36.3)	282 (63.7)	65.102	0.000*
No	87 (79.1)	23 (20.9)		
Vision problem				
Yes	23 (31.9)	49 (68.1)	5.571	0.018*
No	225 (46.8)	256 (53.2)		
History of fall				
Yes	15 (34.9)	28 (65.1)	1.871	0.171
No	233 (45.7)	277 (54.3)		
Hospitalization				
Yes	50 (32.9)	102 (67.1)	12.105	0.001*
No	198 (49.4)	203 (50.6)		
Stress				
Yes	144 (40.4)	212 (59.6)	7.811	0.005*
No	104 (52.8)	93 (47.2)		
Dominant handgrip				
Less strength	110 (41.8)	153 (58.2)	1.851	0.174
More strength	138 (47.6)	152 (52.4)		
BMI				
Below normal	168 (42.5)	227 (57.5)	2.995	0.084
Above normal	80 (50.6)	78 (49.4)		

\*Statistically significant at  $P \leq 0.05$ . BMI: Body mass index

and the presence was strongly associated with the functional limitation ( $P = 0.000$ ). The second set includes nonmodifiable factors such as the presence of chronic disease and a history of hospitalization. Respondents who reported the presence of at least one

chronic illness had a functional limitation ( $P = 0.000$ ). Chronic illnesses such as hypertension ( $P = 0.003$ ) and diabetes ( $P = 0.000$ ) were significantly associated with functional ability. Those who had vision problems were having high (68.1%) difficulty in performing

ADL ( $P = 0.018$ ). History of hospital admission was strongly associated with functional ability ( $P = 0.000$ ).

To understand the influence of each factor on functional limitation, binary logistic regression was conducted. Binary logistic regression showed that the odds of having functional decline was higher in men above 55 years of age (OR = 2.592; 95% CI = 1.597–4.207), those into unskilled occupation (OR = 1.681; 95% CI = 1.050–2.692), presence of at least one chronic disease (OR = 2.608; 95% CI = 1.553–4.378), and presence of aches and pains (OR = 6.605; 95% CI = 3.732–11.689) as compared to their respective counterparts [Table 2].

## DISCUSSION

This study is distinct as it focuses on midlife men and assesses their functional limitation and its correlates. This study revealed a significant number of correlates of functional limitation.

In this study, functional limitation was measured using the ADL instrument. Limitation in these activities was 2.5 times more in respondents aged 55–59 years as compared to younger adults, which show a strong

association with the aging body was found in other studies.<sup>[4,9]</sup> Chronic illness is yet another factor which affects functional decline. Negative effects of the chronic conditions on numerous components of functioning, and consequences in terms of increased health-care utilization, increased emergency hospitalization, and decreased quality of life have been documented previously.<sup>[10-12]</sup> The present results support previously established fact that comorbidities are associated with complications and function limitations, suggesting that interventions are needed early, before diagnosis, to delay or prevent the development of complications and functional limitations.

Literature also mentions a significant role of occupation or working conditions as prominent among causes of functional limitation. In the current study, respondents who were having unskilled occupations were 1.6 times more likely to have functional limitations. They reported long-standing hours (working as watchman and salesman in a shopping store), carrying heavy loads on head and shoulders (laborer in grocery store, market), and work requiring physical strength (working in a butcher shop and automobile repair shop). Research reports that adverse working conditions accelerate the deterioration of a worker's functional ability.<sup>[13,14]</sup> There is a need to promote the use of preventive measures to reduce occupational hazards and to improve the knowledge and skills, use of materials and tools, to prevent the loss and protect the functioning in adults during their working years.<sup>[15]</sup>

Another major finding of the study is the association of aches and pains with functional limitations. It includes generalized pain in their neck, back, knees, or hips, which they hope to disappear sooner or later. The literature shows strong associations between pain and functional limitations. We observed that pain was related to posture and was likely to be associated with the respondents' occupation. Contrarily to the common belief, pain is a common impairment that signals that problems exist within the body.<sup>[16]</sup> It can exert a comprehensive effect on individuals by limiting their activity and causing a negative effect on health and functioning.<sup>[17]</sup> Pain leads to bone deterioration, weak muscle strength, and poor functioning. The large-scale epidemiological studies from different geographic regions found that pain is reported more frequently by women than by men, because men are supposed to endure the pain.<sup>[18]</sup> The reported aches and pains were often not treated. Thus, evaluation and treatment of pain should become an essential component of any primary healthcare.

A major strength of this study is that it involved a large representative sample of middle-aged men, therefore,

**Table 2: Factors associated with functional ability in middle-aged men (n=553)**

Variable	P	OR	95% CI for Exp (B)	
			Lower	Upper
Age				
45-49	0.000*			
50-54		1		
55-59		2.592	1.597	4.207
Occupation				
Skilled	0.031*	1		
Unskilled		1.681	1.050	2.692
Income				
<10,000	0.127	0.597	0.308	1.157
10,000-30,000		1		
>30,000				
Vigorous work activity				
Yes	0.433	0.838	0.538	1.304
No		1		
Presence of chronic disease				
Yes	0.000*	2.608	1.553	4.378
No		1		
Presence of aches and pains				
Yes	0.000*	6.605	3.732	11.689
No		1		
Hospitalization				
Yes	0.441	1.208	0.747	1.955
No		1		

Hosmer-Lemeshow test:  $\chi^2: -5.689$ ,  $df=8$ ,  $P=0.682$ . Nagelkerke  $R^2: 0.368$ . \* $P<0.05$ . OR: Odds ratio, CI: Confidence interval

the results can be generalized in the corresponding age groups. In addition, compared with other studies, this study has collected detailed data on chronic diseases and geriatric conditions. Geriatric conditions, such as chronic pain, falls, hospitalization, vision, and other impairment, stress which often interfere with the outcome. These conditions are often not considered to be important and thus have not been well investigated. However, these conditions are associated with functional decline and can certainly affect the ability of individuals to participate in lifestyle interventions.

## CONCLUSION

Thus, functional limitation was observed in a large number of middle-aged men, and this is one of the few studies to document it. Functional limitation in men is affected by multiple factors. Understanding the association between personal, socioeconomic, and health correlates with functioning has provided much-needed knowledge. From a public health perspective, a better understanding of the risks in this group is important to inform lifestyle intervention programs. Interventions promoting psychosocial well-being and lifestyle modification may improve biological and behavioral determinants of functional limitations.

## Financial support and sponsorship

Grant received under Savitribai Phule Pune University's program UGC-UPE-262[B][2].

## Conflicts of interest

There are no conflicts of interest.

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