

HEALTH STATUS OF MEN AGED 50–70 YEARS WHO ENGAGE IN REGULAR EXERCISE IN SOUTH KOLKATA, INDIA

Shrabonti Dinda¹, Ashok Kumar Biswas², Dr. Shailesh Kumar³

¹Research scholar, Department of physical education, Banaras Hindu University, Varanasi- 221005, email I'd - dindasabo10@gmail.com

²Professor, Department of physical education, Jadavpur University, email I'd - akbiswas_05@rediffmail.com

³Assistant professor, department of physical education, Banaras Hindu University, Varanasi, 221005, shaileshkumar@bhu.ac.in.

ABSTRACT

Background: Regular physical activity is widely suggested to preserve physiological functions and physical fitness in ageing men; however, data specific to certain regions of Indian urban populations remain rare.

Objective: This cross-sectional study measured physical, physiological, and motor fitness constraints in males aged 50–70 years who exercise regularly in the district of South Kolkata, India, and observed the difference in these constraints across four (4) age subdivisions.

Methods: A total of 120 regularly exercising men were engaged by simple random sampling and graded into four groups of 30 as follows (Group A: 50–55 y; B: 56–60 y; C: 61–65 y; and D: 66–70 y). We recorded physical variables (height, weight, and BMI), physiological variables (systolic/diastolic blood pressure, pulse rate, oxygen saturation [SpO₂], respiratory rate, and peak expiratory flow), and motor fitness variables (handgrip strength, one-leg balance, and sit-and-reach flexibility) using standard tools. We tested group differences using one-way ANOVA, followed by Bonferroni post hoc comparisons.

Results: The mean of BMI decreased from 28.08 kg/m² (A Group) to 25.57 kg/m² (D Group). No significant between-group differences were found in systolic blood pressure ($F = 0.24$, $p = .870$), diastolic blood pressure ($F = 0.09$, $p = .963$), pulse rate ($F = 0.17$, $p = .916$), SpO₂ ($F = 0.34$, $p = .793$), respiratory rate ($F = 0.96$, $p = .415$), peak expiratory flow ($F = 1.38$, $p = .252$), or handgrip strength ($F = 1.97$, $p = .123$). Significant age-related declines were observed in one-leg balance ($F = 2.88$, $p = .039$), driven mainly by the difference between Groups A and D ($p = .009$), and lower back flexibility ($F = 7.97$, $p < .001$), with Group D significantly lower than Groups A, B, and C.

Conclusion: In males who engage in regular exercise in South Kolkata, cardiovascular and respiratory parameters were observed to remain stable between the ages of 50 and 70. However, a significant decline in balance and flexibility was noted in the oldest age group. These findings advocate for the inclusion of specific balance and flexibility training in exercise regimens for older men.

KEYWORDS: old; regular exercise; biological health; motor fitness

1. INTRODUCTION

Physical activity consists of any movement produced by skeletal muscles that uses body energy. In contrast, exercise is a systematic, planned, organised, and repetitive activity aimed at improving or maintaining physical fitness health (Caspersen, 1985; Langhammer, 2018). Regular participation in physical activity is consistently connected with better cardiovascular health, stronger muscles, improved mental health, and longer life, although the degree of these benefits can differ among various groups (Kohl et al., 2013).

Aging is associated with physiological changes and responses, including reductions in cardiorespiratory efficiency, muscular strength, balance, and joint flexibility or range of motion which may compromise functional independence (McPhee, 2016; Vopat et al., 2014). It has been consistently demonstrated that regular exercise can attenuate these age-related declines (Chandler, 1996; Mendonca et al., 2016; Seco et al., 2013); however, the magnitude of the benefits varies depending on the population, socioeconomic context, and study design. South Kolkata, India, hosts a significant population of middle-aged and older men who engage in habitual exercise and physical activity in public spaces such as parks and lakeside promenades, providing a unique setting for the investigation of these relationships.

Despite the established benefits of exercise in older adults, region-specific data on Indian men are rare. Therefore, this study aimed to (i) describe the physical, physiological, and motor fitness health status of regularly exercising men aged 50–70 years in South Kolkata and (ii) determine whether these parameters differ significantly across four five-to ten-year age subgroups within this range. It was hypothesized that no significant differences would be found between age groups in physiological parameters (H01) or motor fitness components (H02).

2. MATERIALS AND METHODS

2.1 Study design and setting

A cross-sectional design was employed. Data were collected at Rabindra Sarobar (Dhakuria Lake) and the Jadavpur University main campus playground, both located in South Kolkata, West Bengal, India.

2.2 Participants

A total of 120 men aged 50–70 years who reported engaging in regular exercise were recruited by simple random sampling and stratified into four equal age groups (n = 30 each): Group A (50–55 y), Group B (56–60 y), Group C (61–65 y), and Group D (66–70 y old). All the participants resided in South Kolkata. Table 1 summarizes the descriptive characteristics of the groups.

2.3 Variables and instrumentation

Three categories of variables were assessed in this study. Physical variables, including height (stadiometer, cm), weight (weighing scale, kg), and body mass index (BMI, kg/m²), were measured using standard anthropometric procedures. Physiological variables, including systolic and diastolic blood pressure (digital sphygmomanometer, mmHg), pulse rate (manual radial palpation, beats/min), peripheral oxygen saturation (pulse oximeter, %), respiratory rate (manual chest-movement count, breaths/min), and peak expiratory flow (peak flow meter, L/min), were recorded with participants seated and resting. Motor fitness variables, including handgrip strength (measured using a hand dynamometer in kg), balance (assessed through one-leg-stand time in seconds), and lower back flexibility (measured using a sit-and-reach test with a flexometer in cm), were assessed using standard field tests. All measurements were taken by trained assistants following the manufacturer's standard testing protocols. Each participant was tested once for each variable, except for peak expiratory flow and flexibility, where the best of three trials was recorded.

2.4 Statistical analysis

Descriptive statistics (mean, standard deviation, minimum, and maximum) were computed for all variables within each age group. One-way analysis of variance (ANOVA) was used to test for differences between the four age groups for each physiological and motor fitness variable. Where the ANOVA F-ratio was significant (p < .05), Bonferroni-corrected pairwise post hoc comparisons were conducted. Significance was set at p < .05 for the omnibus tests.

3. RESULTS

3.1 Physical characteristics

Table 1 presents the mean age, height, weight, and BMI of the four groups of participants. Body weight and BMI showed a decreasing trend with advancing age group, with Group D recording the lowest mean weight (66.33 ± 7.45 kg) and BMI (25.57 ± 3.56 kg/m²) values.

Table 1. Physical characteristics by age group (Mean ± SD)

Variable	Group A (50–55 y)	Group B (56–60 y)	Group C (61–65 y)	Group D (66–70 y)
Age (years)	52.2 ± 1.41	57.56 ± 1.41	62.83 ± 1.53	68.36 ± 1.54
Height (cm)	164 ± 7.0	162 ± 9.4	162 ± 8.2	161 ± 6.5
Weight (kg)	72.28 ± 11.64	71.88 ± 11.04	71.26 ± 9.01	66.33 ± 7.45
BMI (kg/m ²)	28.08 ± 5.84	27.27 ± 4.37	27.32 ± 4.08	25.57 ± 3.56

3.2 Physiological parameters

No statistically significant differences were found between the age groups for any physiological variable (Table 2). The mean systolic blood pressure ranged from 130.2 to 133.7 mmHg and diastolic blood pressure from 80.9 to 82.4 mmHg across groups, both within a physiologically stable range. Pulse rate, SpO₂, respiratory rate, and peak expiratory flow also showed no significant age-related variations.

Table 2. Physiological parameters by age group and one-way ANOVA results

Variable	Group A	Group B	Group C	Group D	F (3,116)	p
Systolic BP (mmHg)	130.2 ± 16.52	131.5 ± 16.64	131.4 ± 14.88	133.7 ± 17.40	0.24	.870
Diastolic BP (mmHg)	80.86 ± 8.45	82.26 ± 8.52	81.30 ± 9.55	82.36 ± 12.99	0.09	.963
Pulse rate (bpm)	82.66 ± 2.83	80.80 ± 3.54	82.86 ± 1.41	81.96 ± 7.78	0.17	.916
SpO ₂ (%)	96.86 ± 1.33	97.10 ± 1.03	96.83 ± 1.34	96.80 ± 1.35	0.34	.793
Respiratory rate (bpm)	24.33 ± 4.79	22.80 ± 4.47	22.53 ± 4.90	23.36 ± 3.53	0.96	.415
Peak expiratory flow (L/min)	443.2 ± 73.8	442.7 ± 78.2	453.0 ± 81.2	411.8 ± 97.9	1.38	.252

3.3 Motor-fitness components

Handgrip strength decreased numerically with age (from 43.19 ± 2.19 kg in Group A to 27.52 ± 1.56 kg in Group D), but the ANOVA did not reach significance ($F = 1.97$, $p = .123$). In contrast, both one-leg balance time and lower back flexibility declined significantly across age groups (Table 3).

Bonferroni post-hoc tests for balance showed a significant difference only between Group A and Group D ($t = 2.71$, $p = .009$); no other pairwise comparisons were significant. For flexibility, Group D differed significantly from Groups A ($p < .001$), B ($p < .001$), and C ($p = .001$), whereas Groups A, B, and C did not differ significantly from each other.

Table 3. Motor-fitness components by age group, ANOVA, and post-hoc results

Variable	Group A	Group B	Group C	Group D	F	p	Significant post-hoc pairs
Handgrip strength (kg)	43.19 ± 2.19	36.15 ± 15.57	32.32 ± 6.01	27.52 ± 1.56	1.97	.123	— (ns)
Balance (s)	80.8 ± 43.4	77.7 ± 48.7	63.7 ± 50.8	52.8 ± 36.8	2.88*	.039	A vs D ($p = .009$)
Flexibility (cm)	26.70 ± 8.12	27.16 ± 8.74	24.63 ± 8.47	17.73 ± 8.45	7.97**	<.001	A, B, C vs D ($p \leq .001$)

Note. Values are presented as mean $\pm$ standard deviation (SD) unless otherwise indicated. * $p < .05$; ** $p < .001$; ns = not significant (all $p > .05$).

3.4 Hypothesis testing

H01 (no significant difference in physiological parameters between age groups) was retained, as none of the six physiological variables differed significantly across groups (all $p > .05$). H02 was kept for handgrip strength, indicating no significant difference across age groups, but rejected for balance and flexibility, both of which showed significant failures with age, especially in the 66–70-year group.

4. DISCUSSION

The main finding of this study was that for men who were physically active, the cardiovascular and respiratory variables of blood pressure, heart rate, oxygen saturation, respiratory rate and peak expiratory flow were consistent across 50–70 years of age. This may corroborate previous work that regular aerobic exercise may be protective against autonomic and cardiorespiratory decline into old age (Carter, 2003; Hagberg et al., 1989; Lazarus et al., 2019) and may suggest that continued participation in exercise may help buffer some of the physiological decline typically seen with aging.

In contrast, the motor fitness components showed a declining trend toward older age. Handgrip strength decreased numerically, but not considerably with age, which is consistent with mixed findings regarding grip strength trends in older, physically active men (Bilajac et al., 2020; Porto et al., 2019). However, balance and flexibility considerably decreased among the oldest (66–70 years) age group compared with the younger groups. This is consistent with other studies which have shown a more rapid decline of postural control and range of motion in older adults, even in those who are physically active (Famula et al., 2013; Lelard & Laroche, 2015; Stathokostas et al., 2013), indicating the need for targeted training to maintain these sub-components, after the mid-sixties, in addition to general aerobic or habitual exercise.

These findings have practical consequences for exercise preparation in older Indian men with diabetes. While continuous contribution in regular exercise looks to support unchanging cardiovascular and respiratory health, programs for men in their late sixties and outside should incorporate specific balance (e.g., single-leg stands, proprioceptive training) and flexibility (e.g., stretching and yoga-based mobility work) components to moderate fall risk and preserve functional range of motion (flexibility).

4.1 LIMITATIONS

This study come upon several limitations. The cross-sectional design fundamentally controls the ability to establish causal relationships concerning the effects of exercise on health status of south Kolkata senior citizens. The research was limited to male participants in the districts of South Kolkata who were already active in regular exercise and physical activity, and required a non-exercising control group, thereby limiting the extent to which the findings can be generalized. The designation of “Regular exercise” was based on self-reporting and was not standardized with respect to type, intensity, or duration, potentially introducing variability. Additionally, the study did not justification for potential confounders such as diet, genetics, socioeconomic status, and comorbidities. Lastly, single-session measurements may not reflect daily variation.

5. CONCLUSION

Among men aged 50–70 years in South Kolkata who engage in regular physical activity and exercises, physiological health indicators such as blood pressure, pulse rate, oxygen saturation, respiratory rate, and peak expiratory flow remained stable across various age groups. However, there was a significant decline in balance and lower back range of motion observed in men aged 66–70 years. These findings emphasise the importance of regular exercise in maintaining cardiorespiratory health during the ageing process whilst also highlighting the necessity for age-specific programmes that focus on enhancing balance and flexibility among the oldest segments of the population. Future research should adopt

longitudinal and interventional methodologies, incorporate control groups consisting of non-exercising individuals, and explanation for lifestyle and socioeconomic variables to better clarify the causal relationship between exercise and healthy ageing within this demographic.

REFERENCES

1. BILAJAC, L., Juraga, D., & Žuljević, H. M. (2020). The influence of physical activity on handgrip strength in older adults. *Archives of Gerontology and Geriatrics Research* 35.
2. Carter, J. B. (2003). Effect of endurance exercise on autonomic control of heart rate. *Sports Medicine*, 33(1), 33–46.
3. Caspersen, C. J., Powell, K. E., & Christenson, G. M. (1985). Physical activity, exercise, and physical fitness: Definitions and distinctions for health-related research. *Public Health Reports*, 100(2), 126–131.
4. Chandler, J. M. (1996). Exercise improves physiological and functional performance in old age. *Clinics in Geriatric Medicine*, 12(4), 761–784.
5. Famuła, A., Nowotny-Czupryna, O., & Nowotny, J. (2013). Previous physical activity and body balance in older adults. *Biology of Sport*, 30(4), 241–245.
6. Hagberg, J. M., et al. (1989). Effect of exercise training in 60- to 69-year-old individuals with essential hypertension. *American Journal of Cardiology*, 64(5), 348–353.
7. Kohl, H. W., et al. (2013). Committee on Physical Activity and Physical Education in School Environment. National Academies Press (US).
8. Langhammer B., Bergland A, Rydwick E. (2018). Importance of physical activity among older adults. *BioMed Research International*. 2018.
9. Lazarus, N. R., & Harridge, S. D. R. (2019). The relationships and interactions between age, exercise, and physiological function. *Journal of Physiology*, 597(5), 1299–1309.
10. Lelard, T., & Laroche, D. (2015). Effects of physical training on age-related balance and postural control. *Neurophysiologie Clinique*, 45(4–5), 357–369.
11. McPhee, J. S., et al. (2016). Physical activity in older age: Perspectives on healthy aging and frailty. *Biogerontology* 17, 567–580.
12. Mendonca, G. V., et al. (2016). Impact of exercise training on physiological measures of physical fitness in older adults. *Curr Aging Sci*, 9(4), 240–259.
13. Porto, J. M., et al. (2019). Relationship between grip strength and global muscle strength in community-dwelling older adults. *Archives of Gerontology and Geriatrics*, 82, 273–278.
14. Seco, J., et al. (2013). A long-term physical activity training program increases strength and flexibility and improves balance in older adults. *Rehabilitation Nursing*, 38(1), 37–47.
15. Stathokostas, L., McDonald, M. W., Little, R. M. D. and Paterson, D. H. (2013). Flexibility of older adults aged 55–86 years and the influence of physical activity. *Journal of Aging Research*. 2013.
16. Vopat, B. G., Klinge, S. A., McClure, P. K., & Fadale, P. D. (2014). The effects of fitness on the aging process. *Journal of the American Academy of Orthopaedic Surgeons*, 22(9), 576–585.