

Comparative Study on Health-Related Physical Fitness between Middle-Aged Male Masons and Farmers of Murshidabad District in West Bengal, India

Mursalim SHAIKH¹
Kishore MUKHOPADHYAY²

Abstract

Health is an integral form of human capital that can positively influence agricultural and construction productivity in the physical, mental, and social domains. The work of farmers and masons is still physically demanding, but they are not as active as in the past due to the advancement of science and innovative machinery. Although the benefits of physical activity and exercise are widely acknowledged, many middle-aged and elderly individuals remain sedentary. Heavy carrying and lifting are common activities among farmers and masons that may be related to fitness level. The purpose of the study was to compare the health-related physical fitness between middle-aged farmers and masons from Murshidabad District of West Bengal, India. The study subjects were male farmers (n=20) and male Masons (n=20) with a mean age of 48.67 ± 3.23 and 49.91 ± 3.83 years, respectively, from Murshidabad District of West Bengal, India. Health-related physical fitness was assessed using standardised testing protocols, and a t-test was conducted for statistical analysis. Five health-related physical fitness components (muscle Strength, muscle endurance, flexibility, cardiovascular endurance and body fat percentage) were measured, and none of the measured fitness components were significantly different between farmers and masons. The study concludes that middle-aged village male farmers and masons are similar in health-related physical fitness components.

Keywords: Farmer, Mason, Health-related Physical Fitness.

JEL classification: I12; I15

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1. Introduction

Health and quality of life largely depend upon regular participation in physical activity and exercise among adults (1-3). An active lifestyle is one of the important criteria to lead a healthy and productive life for adults and older adults. An average of 30 minutes of moderate-intensity activities on most days of the week

¹ Assistant professor, Mirzapur B.Ed. College, Bijaypur, Gankar, Murshidabad, W.B., India, mursalim589@gmail.com

² Associate Professor, Union Christian Training College, Berhampore, Murshidabad, W.B., India, kishore.km2007@gmail.com, <https://orcid.org/0000-0001-5384-837X>



is recommended to prevent chronic disease and maintain good health (4). For senior citizens or older adults, moderate average physical activity of 3-6 METS is recommended (5). Despite these recommendations, many middle-aged and elderly individuals prefer a sedentary lifestyle. As per the research report of the Centres for Disease Control and Prevention, United States, in 1996, it indicated that more than 60% of the adult population did not participate in physical activity, and 25% were sedentary (6), which is too alarming for society. Several studies have indicated that an awareness of the importance of physical activity could be attributed to external barriers (refer to factors beyond an individual's control) and internal barriers (factors determined by an individual's personal decision) (8-12).

Several researchers suggest that farmers have a higher rate of physical activity (PA) than those in other professions (13-15). The occupation of farming (farmer) and engaging in constructional works (mason) are associated with carrying and lifting activities over a relatively longer time. Occupational health status has often been used in the literature as a synonym of PA, where much stress has been given on the physical component (16-20). Greater occupational PA has been associated with lower rates of cancer (14), chronic disease (21), cardiovascular disease (22), cardiovascular mortality (23), stroke (24), diabetes (25) and promotes healthy ageing (26).

Health Related Physical Fitness (HRF) is a multidimensional construct comprised of five components (27). These five essential components are CRE, muscular strength (MS), muscular endurance (ME), flexibility, and body composition. Research evidence suggests that there is a positive association between health and CRE, MS and ME (28-29), but the association between health and muscle flexibility are very few (30). There is evidence for associations between CRE and adiposity, cardiovascular disease risk, quality of life and mental health (28).

Several valid and reliable HRF tests are available to be used in field conditions (31-32). In addition to the requirement for valid and reliable measures, time and equipment/equipment are extremely important factors for researchers and health professionals (33).

The purpose of the present study was to find out the differences between middle-aged masons and farmers on health-related physical fitness. It was hypothesised that the health-related physical fitness would differ between farmers and masons.

2. Materials and Methods

Forty male subjects of Jangipur subdivision, Murshidabad District, West Bengal were selected randomly from two different categories, farmer (n=20) and mason (n=20). The age of the subjects ranged between 45-55 years. Health-related physical fitness of the subjects was measured following standardised methods.



- Body fat percentage was measured using the "skinfold" approach, with a computerised body fat calliper, which provides an accurate reading of your body fat percentage (34).
- The 12-minute run for the Cardiovascular fitness test was developed by Kenneth Cooper, in 1968, was used for the study to measure the CRE (35).
- The Sit and Reach test (36) was used to measure the flexibility of the subjects.
- Muscle strength was measured through the 1 RM Test (37).
- The Bent Knee sit-up was used to measure the muscle endurance (38-39).

A t-test was computed for statistical purposes, and $p > 0.05$ level of confidence.

3. Results and Discussion

The age, height and weight of the subjects were presented in Table 1.

Comparison of the profile of the subject

Table 1

	Farmers (n=20)	Masons (n=20)
	Mean and SD	Mean and SD
Age (Year)	48.67 ± 3.23	49.91 ± 3.83
Height (cm)	166.7 ± 2.73	166.3 ± 3.22
Weight (Kg)	63.6 ± 4.95	66.1 ± 7.36
BMI	$22,9 \text{ kg/m}^2$	$23,9 \text{ kg/m}^2$

The age, height and weight of the farmers were 48.67 ± 3.23 years, 166.7 ± 2.73 cm and 63.6 ± 4.95 kg, respectively, whereas, in the case of masons, these values were 49.91 ± 3.83 years, 166.3 ± 3.22 cm and 63.6 ± 4.95 kg, respectively. These values were more or less the same. Table 2 presents the compared health-related fitness components of the two study groups.



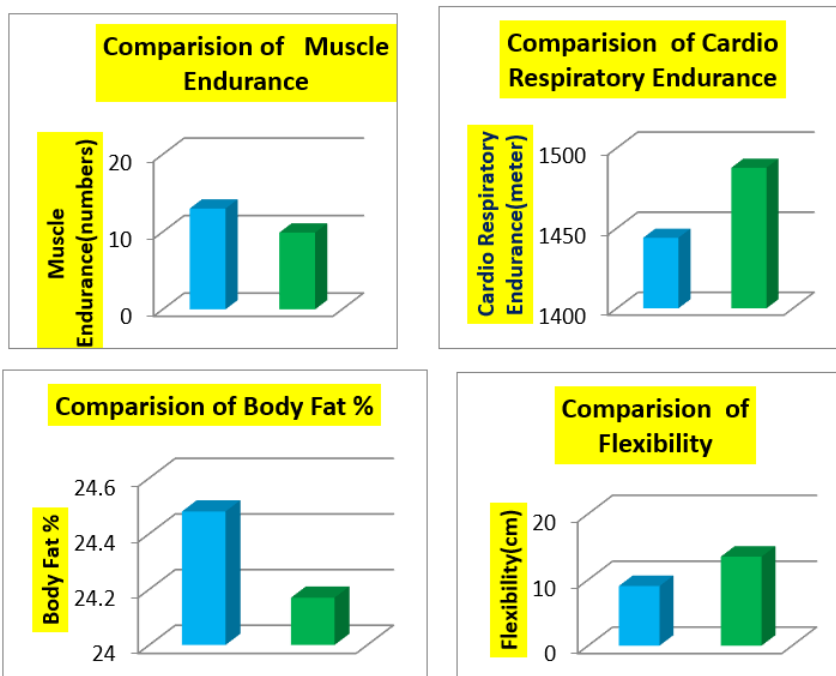
Comparison of Health-Related Physical Fitness Between Middle-Aged Male Masons and Farmers

Table 2

Variables	Masons		Farmers		t value	P value
	Mean	S.D	Mean	S.D		
M.S (Kg)	42.45	±5.23	41.45	±3.91	0.684	0.497
CRE (meter)	1444.00	±206.66	1487.65	±166.56	-0.735	0.466
M.E (number)	13	±9.06	9.9	±2.77	1.463	0.152
Flexibility (cm)	9.04	±7.49	13.49	±8.81	-1.72	0.092
B.F.P (%)	24.48	±2.54	24.17	±2.40	0.396	0.69

The tabulated t-value is 2.024 at the 0.05 level of significance

The difference in health-related physical fitness variables was significant between farmers and masons. Fig-1. Represents the comparison of health-related physical fitness between masons and farmers.



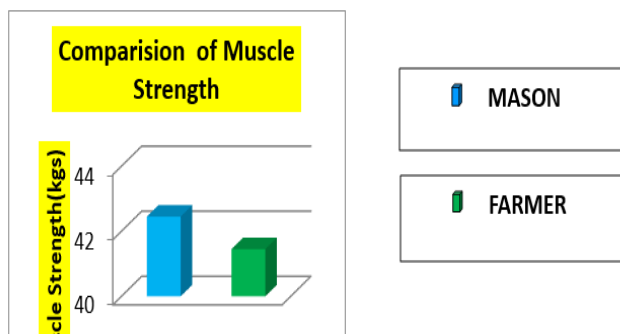


Figure 1. Comparison of health-related physical fitness between masons and farmers

Muscle strength was measured through a 1 RM test. Table-2 indicates that the mean MS of Farmers and Masons were 42.45 ± 5.23 and 41.45 ± 3.91 , respectively, and it was measured in kg.

In general, muscle strength depends upon several factors such as,

- Age and Sex
- Muscle Fibre Type and Size (40-41).
- Genetics

A person's strength is greatly influenced by genetics because genes are linked to the types of muscle fibres and other neurological components.

- Neurological consideration

Neural adaptation concerning high-intensity activities in a regular manner helps to promote greater strength in an individual. The following neurological aspects are related to muscular strength.

- Muscle Capillary Density

A working muscle's capillary supply appears to be of highest relevance for giving it enough oxygen and blood-borne energy substrates. It has been discovered that increased capillarization responds to physical activity, particularly when there is a lot of muscular power (42).

- Exercise Training

Regular physical activity helps older persons maintain a healthy weight, maintain bone mass, maintain muscular function, and guard against falls and fractures. These, along with countless other health advantages, ultimately lengthen the active life expectancy. Loss of muscle strength is significantly influenced by physical inactivity, gender, ageing, and body mass index (43).

Regular physical activity involving lifting and carrying objects for extended periods is directly associated with an individual's muscle strength. Farmers and masons typically engage in strenuous work throughout the day, whether cultivating paddy fields or working in building construction. As the occupational demands for physical activity of both study groups, as well as their lifestyle, are similar, it reflects on their muscular strength component. That may be



the reason for the insignificant difference in muscular strength between masons and farmers.

In the present study, insignificant difference of CRE may be due to age, smoking habits, poor nutrition and insufficient compensatory physical activity of the two worker groups.

CRE is dependent upon several physiological factors, which include:

- (1) transportation of oxygen from the atmosphere to the lungs,
- (2) consumption of oxygen via exchange of gases through alveoli and
- (3) oxygen use at the tissue level in the working muscle.

High-endurance cardiorespiratory have well-functioning heart, lungs, blood, and blood vessels, and skeletal muscles are well-adapted to aerobic metabolism, which depends on central ($\text{Vo}_{2\text{max}}$, maximum heart rates, cardiac output, blood volume, pulmonary diffusion, and hormonal regulations) and peripheral physiological functions (muscle diffusion capacity, mitochondrial enzyme le)" (44-45).

There is a correlation between fitness levels and physical activity patterns, and physical activity is an essential factor in determining cardiorespiratory fitness (46). Although factors such as age, gender, health condition, and genetics all play a role in determining cardiorespiratory fitness, the most important factor is the amount of regular physical exercise someone gets. As a result, cardiorespiratory fitness may function as an objective proxy assessment of recent physical activity patterns (47).

In the present study, farmers and masons have performed strenuous physical activities of a similar nature for a longer time. As the workload of both groups was more or less the same, their cardiorespiratory endurance and muscle endurance also did not significantly differ.

Muscle flexibility is a highly trainable aspect. Since flexibility may be joint-specific, it cannot be regarded as a general characteristic (48). The primary issue with the study of flexibility is the diversity of intervening components, which contributes significantly to its great complexity. The degree of joint flexibility is principally influenced by four variables: mobility, elasticity, plasticity, and pliability (49). Connective tissue in the tendons, muscles, ligaments, and joint capsules controls the flexibility of an individual.

In the present study, there was an insignificant difference between F M in flexibility, which was measured through the sit and reach test. The occupation-related physical activities for farmers and masons are much more similar and active in a natural environment, which leads towards similar flexibility components for both groups.

Obesity, which is defined by a Body Mass Index greater than 30 kg/m^2 , is a widespread and expensive medical issue nowadays (50). It is closely linked to an increased risk of heart disease, stroke, type 2 diabetes, and several types of cancer, as well as early mortality from these conditions (51).



Various determining factors related to body fat percentage, such as,

- ✓ **Age:** The ageing process affects the body composition. However, age-related muscle loss is most common due to a decrease in physical activity (52).
- ✓ **Genes:** Body type and composition are determined genetically, and it is hard to change an inherited body type described by Goodpaster et al (2006) (53).
- ✓ **Hormones:** Hormones are another factor that affects body composition. Gains in muscle mass are attributable, in part, to the male sex hormone testosterone (54).
- ✓ **Sex:** Women tend to have higher levels of body fat than men do because of a combination of genetics and hormones.
- ✓ **Race or ethnicity:** Several racial and ethnic minority groups have a higher prevalence of obese individuals. African Americans in the United States have the greatest obesity rate among adult populations, followed by Hispanics and Latinos, and finally by Caucasians. This is true for both males and females (55).
- ✓ **Eating habits:** If healthy meal plans are ignored, a person's eating habits may increase their risk of gaining excess weight and developing obesity.
- ✓ **Inadequate sleep:** People who don't get enough sleep could consume more calories and snacks than those who get adequate rest (56).
- ✓ **Physical activity:** Because having less body fat helps an athlete's ability to compete in their chosen sport, athletes often have a lower proportion of body fat than physically fit persons. However, current research suggests that combination activities not only raise free-fat body mass but also show more effective effects in lowering fat mass and percentage (57).

As there was no significant difference between the means of F and M for body fat percentage, we can conclude that the groups were homogeneous in terms of body fat percentage.

Hence, the hypothesis is rejected, and the null hypothesis is accepted: the health-related physical fitness of middle-aged male farmers and masons is the same.

4. Conclusions

Within the limitations of the following conclusions have been drawn:

As the food habits, lifestyle and nature of physical activities of farmers and masons are the same, the health-related physical fitness component is also similar.

1. The muscle strength of farmers and masons is similar.
2. Muscle endurance and cardiorespiratory endurance are similar for middle-aged farmers and masons.
3. The flexibility component of farmers and masons is also identical.
4. The body fat percentage of farmers and masons is similar.



It is concluded that due to the same nature of physical activities or workload, health-related physical fitness is similar for middle-aged farmers and masons regardless of occupation.

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