

## A STUDY OF HEALTH-RELATED FITNESS AND CARDIOVASCULAR DISEASE RISKS IN THE AGRARIAN MALE POPULATION OF PUNJAB.

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### ABSTRACT

**BACKGROUND** Agriculture is a hazardous occupation in terms of fatalities, injuries, illness and overall health. Identifying the health-related fitness issues of farmers helps health professionals to be aware of the preventive measures and also in creating a physically active or sporting environment in society for the betterment of the population.

**METHODS** Study was conducted on 300 farmers of Punjab to assess their health-related fitness through a Health Related Fitness test battery that included all the major parameters like Cardiorespiratory endurance (using Resting Heart Rate, Blood Pressure and YMCA 3-minute step test), Muscular strength and Endurance (using 1-minute Push-ups and 1-minute Bent knee sit-ups), Flexibility (using Modified Sit and Reach test) and Body composition (using Body Mass Index, Sum of 4 Site Skinfold) Cardio Vascular Disease Risk Screening (using Waist / Hip Ratio).

**RESULT** Farmers were lacking with all the health-related Fitness parameter values were significantly lower than the norms ( $p < 0.01$ ) which was ultimately affecting their health and increasing the risk of diseases and injuries

**CONCLUSION** To minimize the risk and prevent health problems, the inclusion of Recreational sports, promoting leisure-time physical activities and organizing awareness programs about health, wellness and occupational ergonomics at the village level where agriculture is the major chief occupation and the major source of living.

**Key Words:** Health Related Fitness, Disease Risk, Agrarian Population, Farmers of Punjab.

### INTRODUCTION

Nearly two-thirds of the Indian population lives in the villages and depends mainly on agriculture and other related occupations for their livelihood (3). Half of the world's labour force, or over 1.3 billion people, are employed in the agricultural industry in rural areas and among that Punjab is the most agriculturally developed state of India situated in the Northern part of the country (1). Agriculture is the backbone of the state economy and hence been the major occupation in the rural parts of the Punjab (6).

Agriculture is one of the three most dangerous industries in terms of fatalities, injuries, and illnesses attributable to the workplace (2,3). In addition to bearing the physical

burdens due to long and strenuous work hours, farmers experience stress related to the environment, psychological states, social factors, potential illnesses and the mainly physiological and physical stress that causes high work-related musculoskeletal disorders (WMSDs) in different parts of the body mainly like neck pain, lower and upper back pain and knee or ankle injuries (3,4).

Agriculture involves lots of physical activity in day-to-day chores. Still, these activities are different from exercise (4,5). Farm workers have to perform manual, continuous rigorous tasks in the agricultural field with inadequate rest and awkward posture for extended periods of time and that adversely affects their physical health which leads to chronic diseases that become fatal (1,3).

Most tasks are carried out in the open air, exposing farm workers to all climatic conditions of overheating, overcooling and dust that play a significant role in developing physiological stress on their body like accumulations of fatigue, heat strokes, hypertension, depression, anxiety, heart failure, (1,3) the people of Punjab are battling health problems including a noticeable rise in cancer cases, reproductive health problems, mental retardation and kidney ailments. (9)

Researchers have shown that physical and physiological fitness is required most for the ones who are involved in agricultural activities to prevent them from any kind of stress, diseases or injuries and the main aim of this study was to assess the physical and physiological fitness of the farmers, to make them aware about the physical and physiological demands of their occupation and recommend them the remedies for the improvement of their health, fitness and wellness. (10,11)

## **MATERIALS AND METHODS**

### **Participants and study design**

In the study, 300 agricultural male farmers of 3 different age groups, Group A of 25-35 years, Group B were 36-45 of age and Group C of 46-55 years of age were studied. They were selected by simple random sampling method from the six districts of Punjab covering three regions of Malwa, Majha, and Doaba in the state.

All the participants of the study underwent the Health-Related Fitness (HRF) Assessments like Cardiorespiratory Endurance, Muscular Strength and Endurance, Flexibility, Body Composition and BMI estimation along with Cardiovascular Disease risk screening like Waist / Hip Ratio.

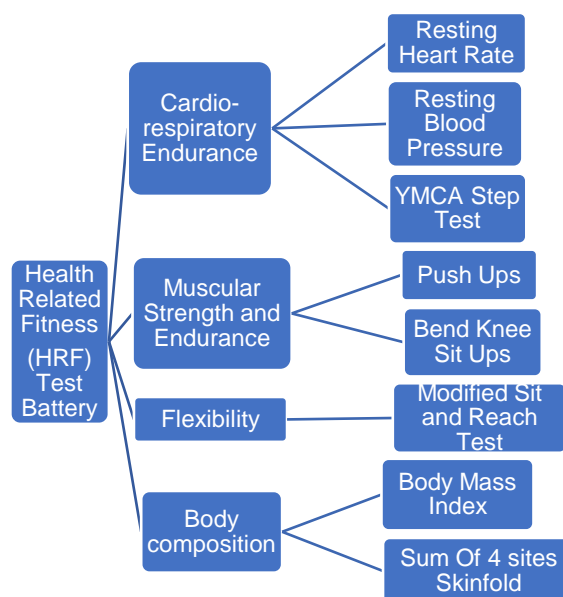


Figure1: Components of Health-Related Fitness (HRF) test battery used in the Study.

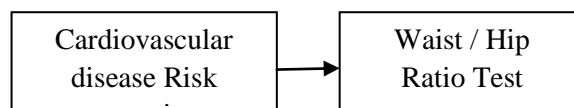


Fig 2: Components of Cardiovascular Disease Risk Screening (CVD)

A test battery was designed for the assessment of Health-related fitness (HRF) which included all the chief parameters of fitness. Each participant has performed all the tests of the HRF assessment test battery. An informed consent has been taken from the participants. Participants with any kind of known medical history of chronic health issues have been excluded. Any possible queries were resolved to ensure clarification. Firstly, their height and weight were measured and recorded and the data was collected in the individual's datasheet.

For Cardiorespiratory endurance, their Resting Heart Rate (RHR), Resting Blood Pressure and YMCA 3-minute Step test were performed to assess the efficiency of the cardiovascular and respiratory systems. Muscular Strength and Muscular Endurance were assessed through 1-minute Push-ups and 1-minute Bent knee sit-ups tests. Lower back and hamstring Flexibility were assessed by using the Modified Sit and Reach Test and for Body Composition assessment, Body Mass Index and 4-site Skinfold (Jackson and Pollock method) tests were performed.

For Risk of Cardiovascular disease screening, their Waist to Hip Ratio (WHR) was assessed to assess the cardiovascular disease risk among the study population.

Norm tables were used to compare the raw data to the standard norms of a particular test and to interpret the results. Norms were very useful in classifying the subjects according to their ability and used to grade the subjects according to their test performance.

## Statistics

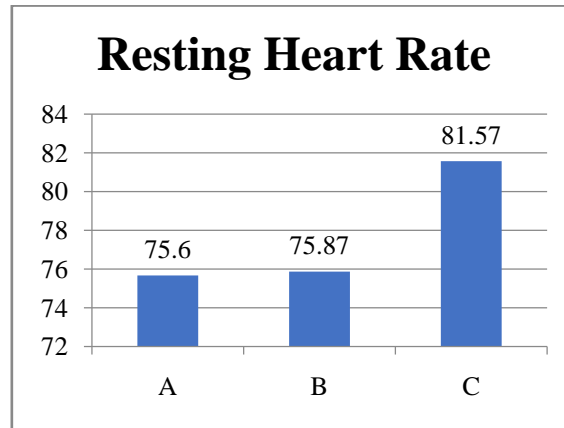
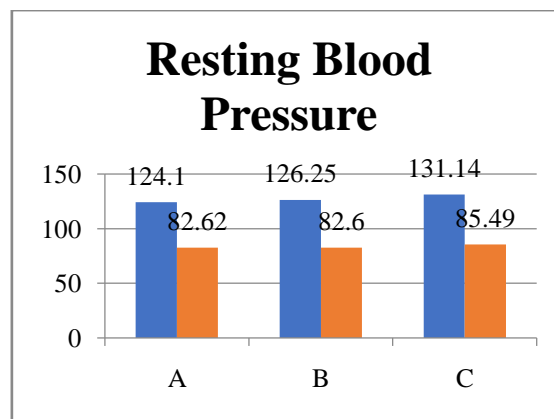
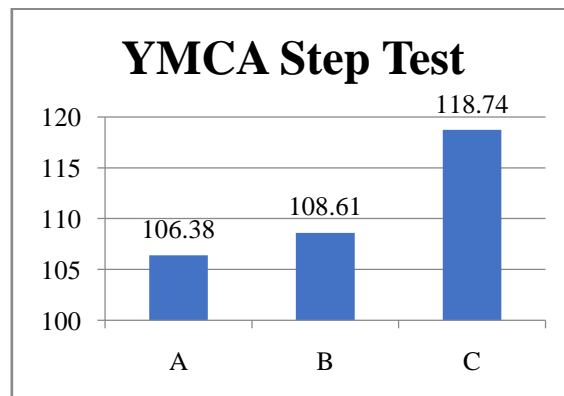
Statistical analyses were performed using SPSS Software. Shapiro Wilk test was used to test the normality of data. Descriptive statistics were expressed as mean ( $\pm$ Standard Deviation (SD)) for each variable. For the data collected in the current study, the mean value, standard deviation, ANOVA single factor, standard error of the mean and independent t-test were applied to analyse the data. Significance was set at an alpha level of 0.05.

## RESULT AND DISCUSSION

Table 1 Mean and SD values of all the Health-Related fitness parameters of three groups.

HRF ASSESSMENT			
	A	B	C
Resting Heart Rate	75.66 $\pm$ 4.2	75.87 $\pm$ 6.4	81.57 $\pm$ 6.5
Resting Blood Pressure	124 $\pm$ 6.1 / 82 $\pm$ 3.9	126 $\pm$ 8.2 / 82 $\pm$ 4.8	131 $\pm$ 6.1 / 85 $\pm$ 4.0
YMCA Step Test	106 $\pm$ 11.1	108 $\pm$ 11.4	118 $\pm$ 12.0
Push-ups	24.7 $\pm$ 9.4	16.68 $\pm$ 6.1	9.88 $\pm$ 5.3
Bent Knee Sit-Ups	27.45 $\pm$ 8.0	19.89 $\pm$ 8.8	11.49 $\pm$ 5.8
Modified Sit and Reach Test	0.46 $\pm$ 2.0	-0.415 $\pm$ 1.7	-0.375 $\pm$ 2.3
Body Mass Index	26.3 $\pm$ 2.4	26.31 $\pm$ 1.9	27.04 $\pm$ 2.8
The sum of 4 sites Skinfold	79.48 $\pm$ 11.2	83.55 $\pm$ 11.8	89.01 $\pm$ 16.1
Waist / Hip Ratio	0.89 $\pm$ 0.0	0.9 $\pm$ 0.0	0.96 $\pm$ 0.0

The mean value of their cardiorespiratory endurance tests for Resting Heart Rate in Group A was 75.66  $\pm$  4.2, in Group B it was 75.87  $\pm$  6.4 and in Group C it was 81.57  $\pm$  6.5 which was in the average range according to their age group when compared with the standard norms. The mean value for Blood pressure in Group A was 124  $\pm$  6.1 / 82  $\pm$  3.9, in Group B it was 126  $\pm$  8.2 / 82  $\pm$  4.8 and in Group C it was 131  $\pm$  6.1 / 85  $\pm$  4.0 which was a normal range according to the norms of World Health Organisation (WHO). The mean value of the YMCA 3-minute Step test in Group A the post exercise heart rate was 106.38  $\pm$  11.1, in Group B it was 108.61  $\pm$  11.4 and in Group C it was 118.74  $\pm$  12.0, and it shows the Average level of cardiorespiratory endurance in participants concerning their age groups when compared with the norms. This level is because they adapted to working for long hours in the fields, but overheating and over-cold environmental exposures for hours can lead to coronary heart diseases, cardiac arrest, heat strokes and increased mortality rate. (7,8)

Fig 3: Mean  $\pm$  SD values of Resting Heart RateFig 4: Mean  $\pm$  SD values of Resting Blood PressureFig 5: Mean  $\pm$  SD values of YMCA 3-minute Step Test

It was observed that the mean value of the 1-minute Push-ups test in Group A was  $24.7 \pm 9.4$ , in Group B it was  $16.68 \pm 6.1$  and in Group C it was  $9.88 \pm 5.3$  which was in the average range according to the norms concerning their age group. The mean value of 1-minute Bent Knee Sit-ups in Group A was  $27.45 \pm 8.0$ , in Group B it was  $19.89 \pm 8.8$  and in Group C it was  $11.49 \pm 5.8$  which was in the Below Average range for all the three groups with respective of their age group. This result showed they were lacking in core strength which can lead to a major risk of back and lower body injuries while working in the field and having more musculoskeletal pains.

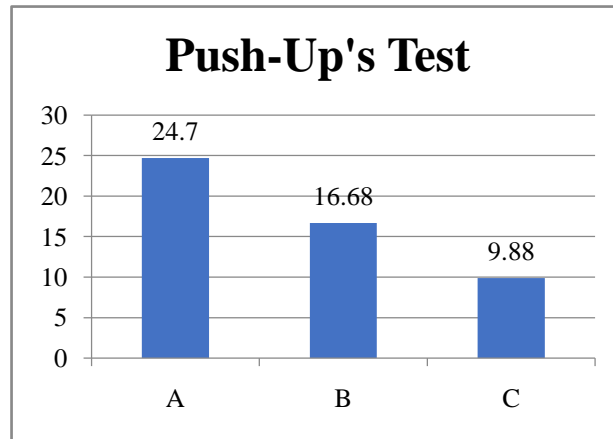


Fig 6: Mean ± SD values of 1-minute Push-ups Test

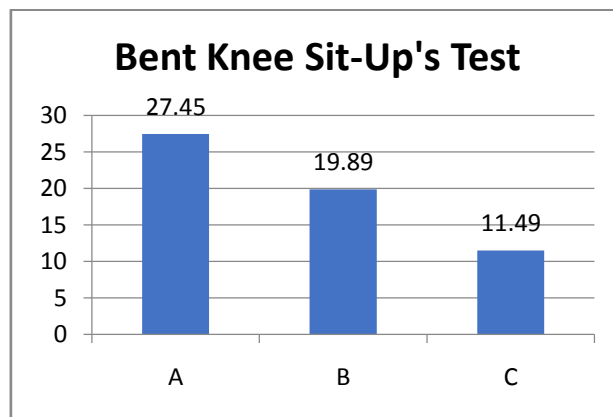


Fig 7: Mean ± SD values of 1-minute Bent Nnee Sit-Ups Test

The mean value for the Modified Sit and Reach test for Group A was  $0.46 \pm 2.0$ , for Group B it was  $-0.415 \pm 1.7$  and for Group C it was  $-0.375 \pm 2.3$  which was Below Average ranges concerning their age group. This has shown a lower level of flexibility in the lower back region and the hamstring muscle increasing the chances of major injuries like sprains muscle strains and muscular imbalances due to poor mobility of lower body muscles and joints which were affected by the awkward postures and can cause work-related musculoskeletal disorders in their early age.

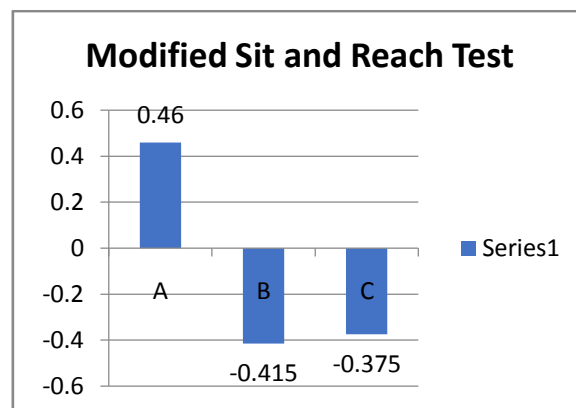


Fig 8: Mean ± SD values of Modified sit N reach

The mean value for the Body Mass Index (BMI) of Group A was  $26.3 \pm 2.4$ , for Group B it was  $26.31 \pm 1.9$  and for Group C it was  $27.04 \pm 2.8$  which classified under the overweight category and pre-obese subcategory according to the WHO norms. It shows they were at high risk of getting illnesses and diseases. For their body fat percentage 4-site skinfold test was done and the mean value for Group A was  $79.48 \pm 11.2$ , for Group B it was  $83.55 \pm 11.8$  and for Group C the value was  $89.01 \pm 16.1$ . All three mean values for all three age groups were classified under the high fat content category they all have high fat mass in their body which puts them at a higher risk of diseases. Obesity is a major modifiable risk factor for diseases and health problems like heart ailments, diabetes mellitus, dyslipidaemia, and hypertension.

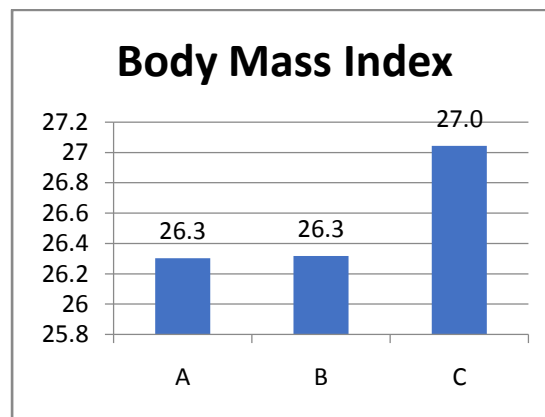


Fig 9: Mean  $\pm$  SD values of Body Mass Index

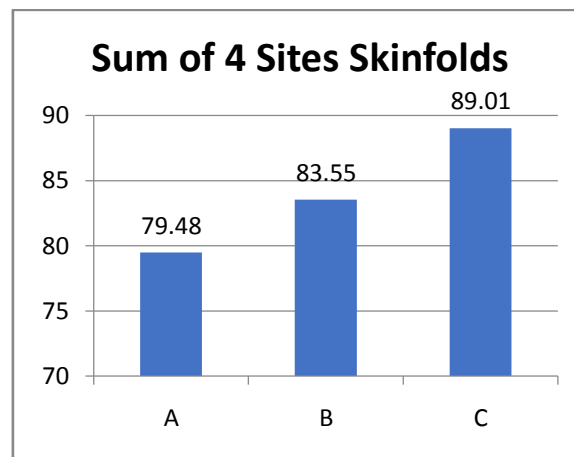


Fig 10: Mean  $\pm$  SD values of the Sum of 4 sites skin fold

The result of the Cardiovascular disease risk screening, the mean value for Waist to Hip ratio test of Group A was  $0.89 \pm 0.0$ , the mean value of Group B was  $0.9 \pm 0.0$  and the mean value for Group C was  $0.96 \pm 0.0$  which showed that all groups were in the average category as per norms because of intra-abdominal obesity as compared to the other body parts and this is associated with the higher chances of getting future cardiovascular ailments including incidences of heart attack and type 2 diabetes. (8)

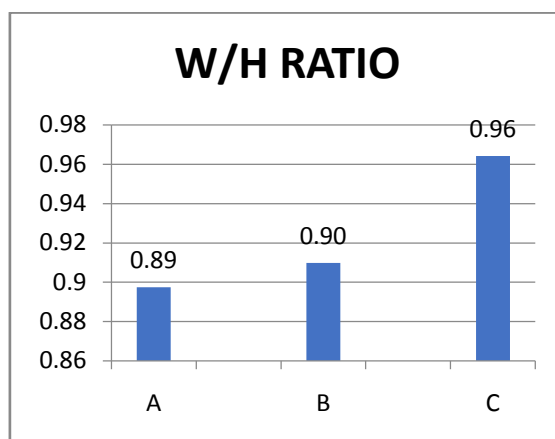


Fig 11: Mean  $\pm$  SD values of Waist to Hip ratio test

It was observed that the mean score of the selected health related fitness components and cardiovascular disease risk screening was less in the agrarian population when compared to the norms which highlighted the lack of health-related fitness in the study population. It can lead to a high risk of health-related issues in their life at later stages. It can be prevented or at least improved by the active involvement of the agrarian population in the proper guided physical activities in their day-to-day life for better health and prevention of health problems.(8)

The study suggested that this objective could be achieved by organizing awareness camps promptly, about the health and wellness of farmers and villagers in every village. Increasing awareness about the involvement in Leisure time physical activities can be a great tool in this direction. Development of recreational sports by enhancing the sports infrastructure for the population should be on priority. Increasing participation of every age group of the study population in sports at the grassroots level and organizing regular rural sporting events can come in handy to improve the health of the rural population. Emphasis should be given on bringing awareness among the targeted population about occupational health and agricultural ergonomics for better health and productive occupational life.

## CONCLUSION

This study mainly indicated that farm workers involved in farming activities were suffering from work-related musculoskeletal pains and disorders due to prolonged awkward (squatting, bending and twisting) postures with a high amount of repetitiveness.

Although the injuries were an accidental mechanism in general the injury processes involve either less use (hypo activity) or overuse (hyperactivity) conditions.

Farmers were more prone to major modifiable disease risk factors of cardiovascular disease, coronary heart disease, diabetes mellitus, dyslipidaemia and hypertension. All these were associated with their lifestyle and occupational habits.

The study recommended that there is a dire need for the implementation of ergonomics interventions with proper awareness among agriculture workers, organizing recreational



sports, promoting leisure time physical activities, awareness about health and wellness and educating them about occupational health for better health outcomes and enhancing productivity.

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