

Original article:

Is the physical fitness of working women better than homemakers?

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Abstract:

Background: Physical inactivity is a major risk factor for health problems. Working Women have double burden of work and care of their children and also manage the house. Homemakers also have to perform all household chores as well as take care of their children. Mumbai is a Metropolitan city with a diverse population and a large number of Women go out to Work / study and equally large are engaged in full time home activities. Health related physical fitness of a Woman has a bearing on the Society as a whole. To evaluate the relationship between Physical Characteristics and maximum oxygen uptake ($\dot{V}O_{2max}$) in Working Women and Homemakers and Comparison of the Physical Fitness parameters in them.

Methodology: The study was carried out on 70 Working Women & 70 Homemakers in age of 20-40 years from Mumbai. The Resting Heart Rate, Height, Weight, Body Mass Index, $\dot{V}O_{2max}$ or Cardiovascular Fitness, Hand Grip strength, Flexibility and Co-ordination was assessed and compared.

Results: The study highlighted that Working Women in the active age group of 20 – 40 years had Significantly lower Body Mass Index , Significantly higher Relative and Absolute $\dot{V}O_{2max}$, Better Hand-Grip Strength compared to Homemakers . The Resting Heart Rate, Flexibility and Finger Dexterity did not vary significantly.

Conclusion: Working women showed better Physical Fitness levels compared to Homemakers.

Key Words: Cardiorespiratory Fitness, Working Women, Homemakers, Physical Fitness.

Introduction:

Muscles should be trained and exercised by sufficient daily use. Too much confinement by sedentary occupation, in study, or by simple indulgence in indolent habits, will certainly impair the strength of the body and injuriously affect health” These wise words given more than 140 years ago by J. C. Dalton; a Physiology Professor reinforces to us the importance of maintaining a healthy respect for the past¹. There is a growing national and international interest in the recognized link between physical activity and health. Hundreds of studies have provided evidence of

association between physical inactivity and common diseases, including obesity, hypertension, type 2 diabetes, colon cancer, osteoarthritis, osteoporosis, and cardiovascular disease (CVD)^{2,3}

Women are generally ignorant about the importance of physical activity or exercise. The study of exercise in women is a relatively new phenomenon. Women have at times held records faster than men—for instance, for the two-way swim across the English Channel, where the availability of extra fat seems to be an advantage for heat insulation, buoyancy, and extra long-term energy⁴

It is quite recent that Common Women are coming out of their homes to seek an income oriented work in order to achieve Economic Independence. Working Women have double burden of work and care of their children and also manage the house. Homemakers also have to perform all household Chores as well as take care of their children and manage the house. In this way both groups work from morning till late night without having much time for Physical Health and Fitness sometimes even recreational activity⁵. Mumbai is a Metropolitan city with a diverse population with respect to height, weight, stature, nutritional status, socioeconomic conditions etc. and a large number of Women go out to Work / study. Equally large numbers of Women are engaged in full time home activities. Health related physical fitness of a Woman has a bearing on the Society as a whole as a Woman is Primarily a Caretaker. Previously Sedentary Women experienced a graded dose-response change in fitness across various levels of Exercise⁶. So we have undertaken this study to compare between Working Women and Homemakers to find out which category is more physically fit in response to tests administered, to improve the level of physical fitness in Women and Inculcate Physical Fitness as a Lifestyle.

Aims and Objectives:

To evaluate and compare the Physical Fitness Levels of Working Women and Homemakers aged 20-40 years by evaluating the relationship between Physical Characteristics and maximum oxygen uptake ($\dot{V}O_{2max}$) in Working Women and Homemakers and Comparing the other physical Fitness parameters in them.

Material and Methods:

The Study was conducted on 70 Working Women and 70 Homemakers aged 20-40 years from Tertiary Health Care Centre and Suburbs of Mumbai in two groups. Before conducting the study, Institutional Ethics Committee approval was taken and necessary permission was obtained.

Each subject was advised to desist from eating, drinking or doing any sort of activities at least for 2 hours before the onset of the experiment. Each experimental subject was allowed to take rest in a recumbent position, half an hour before the experiment started. The tests were properly explained and demonstrated and sufficient practice trials were given.

Working Women and Homemakers in the age group 20 - 40 years who volunteered for the study after proper consent, Non-pregnant, having normal cardiorespiratory functions, physically healthy (able to walk or perform regular physical activity) and Women with Body Mass Index of 18.5 – 24.9 were assigned to the two groups.

Sedentary Women Group (Homemakers):

- a) Women who are sedentary (not exercising for at least 20 minutes for 3 days per week)⁷
- b) Women with no leisure-time physical activity for the past 6 months (physical activity 2 times per week) or competitive sports (e.g. marathon runners, swimmers, tennis player)⁸

Working Women Group:⁹

- a) Women who were working maximum 48 hours/week in Government/Private Sector in different fields.
- b) These women were not involved in any trained physical activity. They were engaged in an eight-hour job, and regular traveling to the working place in addition to the regular household chores.

In the Study, Women with Cardiorespiratory illness like Asthma and Valvular Heart Disease, Women who underwent major Surgery recently, Women with history of any Neuromuscular Disorder or Skeletal Abnormality, and Women with medications that could impair exercise performance or tolerance were not taken.

A detailed history including their personal, present and past illness and family history were recorded. General examination was carried out prior to a systemic examination of cardiovascular, respiratory, alimentary and nervous system.

Test Procedure:

Heart Rate: Subjects were asked to rest for 30 minutes before recording the Basal Heart Rate prior to exercise

Height and Weight:

Measured by a Measuring Scale and Weighing Machine respectively.

Body Mass Index (BMI): Computed by the formula $BMI = \frac{Weight (kg)}{Height (m^2)}$

Queen College Step Test¹⁰ for the Measurement of Maximum Oxygen Uptake ($\dot{V}O_{2max}$): The Queen's College Step test is, a 3-minute step test in which a stepping bench of height 16.25 inches (41.3 cm) was employed. After completion of exercise, subjects remained standing while heart rate was measured for 15 seconds, 5 to 20 seconds into recovery. The recovery heart rate was converted into beats/minute (15-sec HR X 4). Aerobic capacity ($\dot{V}O_{2max}$) was indirectly determined by substituting the step-test (ST) heart rate in the following formula:

$$\dot{V}O_{2max} = 65.81 - [0.1847 \times ST \text{ pulse}]$$

$\dot{V}O_{2max}$ is computed in $ml \cdot kg^{-1} \cdot min^{-1}$;

ST pulse is measured in $beats \cdot min^{-1}$.

By this test Cardiorespiratory Fitness is assessed

Hand-Grip Test:

The Smedley's hand grip strength dynamometer (Anand Agencies, India) was held with the dominant hand as much with force as possible to test Strength. Three attempts were given with 10 seconds gap between them and results were recorded in kilograms. The best trial was recorded. By this Muscular Strength is assessed.

Sit and Reach Flexibility Test:

The purpose was to determine the flexibility of the lower back and hips. Sit and Reach Apparatus made by Anand Agency, India was used.

Scoring: The maximum distance in cm reached by the subject during maximal stretch was recorded. The subject was required to hold this position for at least 2 seconds. The best score of the 3 attempts was recorded

(pre exercise resting values) by palpatory method for complete one minute.

Finger Dexterity Test:

The O' Connor finger Dexterity Apparatus

The subject was asked insert 3 pins in each of the pits and the time taken to complete as fast as possible, was recorded and compared.

This test was used to assess Co-ordination.

Parameters Measured

Resting Heart Rate, Height, Weight, Body Mass Index.

$\dot{V}O_{2max}$ measured and Cardiovascular Fitness compared, Hand Grip test for muscle strength assessed, Flexibility computed and compared.

Finger Dexterity assessed and Co-ordination Compared.

Result:

The study was carried out on 70 volunteer Working Women aged 20-40 years from tertiary health centre of Mumbai in one Group and 70 volunteer Homemakers from the Suburbs of Mumbai in the age 20-40 years in the other Group.

Analysis was done by SPSS-IS software. The descriptive statistics i.e. Mean and Standard deviation (SD) was used for describing parameters. ANOVA Test was used to compare the Resting Heart Rate, the Body Mass Index, $\dot{V}O_{2max}$, the Flexibility, the Muscular Strength and Co-ordination between the two groups. The appropriate tests of significance were applied.

The Average Age of Working Women was 30.39 years and of homemakers 32.03 years which was not statistically significant. The mean Weight of Working Women was 56.76 kg and of Homemakers 56.17 kg which was not statistically significant. The mean Height

of Working Women was 159.7 cm and of Homemakers was 155.53 cm which was Statistically Significant. The mean resting Heart Rate was 74.21 bpm among working

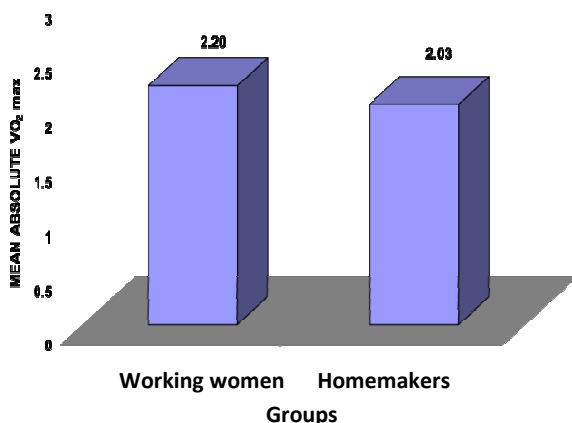
women and 73.33 bpm among homemakers which was comparable and difference not statistically significant.

Table:1 Physical Fitness Parameters in Working Women and Homemakers

Parameters (Mean values)	Working Women	Homemakers	Result
Body Mass Index (kg/m ²)	22.24	23.18	Significant
Relative $\dot{V}O_{2max}$ (ml/kg/min)	38.77	36.11	Significant
Absolute $\dot{V}O_{2max}$ (L/min)	2.20	2.03	Significant
Hand Grip (kg)	23.03	19.08	Significant
Sit and Reach (cm)	24.96	23.41	Not Significant
Finger Dexterity (min)	7.48	7.35	Not Significant

Graph 1:

Comparison of mean absolute $\dot{V}O_2$ max between two groups



Discussion:

India already has, after China, the largest number of women in the workforce. About 30-35 per cent of the estimated 480 million jobs are being performed by women, with a very large proportion actually in rural India¹¹

The normal routine of an average working woman is about seven hours of job, two-four hours of travel in trains, buses and the usual house hold work. This routine hardly leaves any scope for active physical fitness protocol. The Statistics of Homemakers is hardly available due to the number of self-identified homemakers who hold part-time jobs such as substitute teaching in schools, seasonal retail work, having a home based business like selling cosmetics, plastic ware or other products, supplying homemade food, knitting, tailoring, baby-sitting, tutoring or generate income in some other way.

Varghese M. A. carried out a study to determine the aerobic capacity of twenty-six healthy women homemakers residing in the metropolitan city of Mumbai with a view to evaluating their cardio-respiratory fitness and ascertaining the job-demand-fitness-compatibility in household activities¹²

This study highlighted the fact that Working Women in active age group of 20 – 40 years had significantly lower Body Mass Index, significantly higher Relative and Absolute $\dot{V}O_{2max}$ or Cardiorespiratory Fitness, Better Hand-Grip Strength compared to Homemakers of the same age group.

The Resting Heart Rate, Flexibility and Finger Dexterity did not vary significantly in the two groups. Since the difference in ages in two groups was not statistically significant, we can safely assume the findings in both groups are not due to the age differences in two groups. Previously Sedentary Women experienced a graded dose-response change in fitness across levels of Exercise Training⁶. Low levels of cardiorespiratory fitness are associated with high risk of mortality and improvements in fitness are associated with reduced mortality risk⁶. Persons with low levels of physical fitness had a higher risk for the development of comorbidities when compared with fit persons¹²

The Body Mass Index is most popular Clinical Standard used for the estimation of Body Composition. In this study the mean Body Mass Index was 22.24 ± 01.40 among working women & 23.18 ± 01.25 among homemakers which was comparable but difference was statistically significant.

Considerable evidence suggests that the loss of strength and muscle mass appear to be the inevitable consequences of ageing and inactivity and that the body fat increases with ageing¹³.

Good Paster BH et al was one of the first to show that the regular physical activity prevents both the age associated loss of muscle strength and increase in the muscle fat infiltration in older adults.¹⁴

Probable cause of lower Body Mass Index in Working Women: Working Women have double burden of work with travel as well as take care of their children and also manage the house. This physical activity stimulates fat catabolism, increasing the resting metabolism in the body cells. There is facilitation of lipid mobilization and oxidation especially from the visceral adipose tissue. There is increased relative fat loss, preserving the fat free body mass. There is an increase in the protein in skeletal muscle. There is an increase in estimated daily energy expenditure causing calorie expenditure¹⁵

Cardiorespiratory Fitness

There are various tests to assess the Cardiorespiratory Fitness of individuals, among which the maximum oxygen uptake ($\dot{V}O_{2max}$) is universally accepted as the gold standard.

The "Queen College Step Test" or "QCT" is an indirect way to estimate the subjects VO_{2max} (McArdle et al., 1986). Chatterjee *et al.* (2005) reported that the QCT has been standardized among Indians who can easily perform this test without any premature exhaustion probably for its simple experimental protocol with lower stool height and slower cadence^{16,17} According to Chatterjee et al. (2005), QCT is a valid method to evaluate cardio-respiratory fitness in terms of VO_{2max} for large numbers of sedentary female students of West Bengal, India¹⁶

In our Study, the Relative $\dot{V}O_{2max}$ was 38.77 ± 02.29 ml/kg/min in Working women and 36.11 ± 0.81 ml/kg/min in Homemakers, which was statistically significant. Correspondingly the Absolute $\dot{V}O_{2max}$ was

2.20 ± 00.22 L/min in Working Women and 2.03 ± 00.22 L/min in Homemakers being statistically significant.

Homemakers and those in lower status occupations were less likely to report participation in Vigorous leisure time physical activity sufficient for Cardiorespiratory Fitness which was similar to our study^{6,7}

Pereira et al also found that female homemakers reported less total physical activity than unskilled and professional workers, which is compatible with our findings. Further researches, when home-based physical activity was assessed in a further study of women in the same cohort, significant inverse associations were found with all-cause mortality and Cardiovascular Disease mortality. This finding highlights the importance of assessing different domains of physical activity.

Muscle Strength

Static Muscle Strength is measured by Smedleys' Hand-grip Dynamometer. In this study mean hand grip was 23.03 ± 03.59 kg among working women which was significantly more as compared to 19.80 ± 03.44 kg among home makers. A study done on rural female students and urban female students in Punjab showed that the rural females are superior to Strength, Endurance and Speed. In another study a positive correlation was observed between Body Mass Index and Hand Grip Strength ($r = 0.6$, $P = 0.05$, $n = 11$) in overweight females. When comparing Males and females in a study done by researcher - in each age group, males had greater grip strength than did females, and strength declined with advancing age in both sexes^{18,19}

Flexibility

In a study done by Manmeet et al in female students the urban female students were superior to rural female students in Agility and Flexibility¹⁹.⁵ In our study the mean sit & reach was 24.96 cm among working women and 23.41 cm among homemakers which was comparable & difference was statistically insignificant. This may be due to, Homemakers being equally active in household chores and child

care and are flexible and efficient. Modern Homemakers also actively participating in dance (amateur), part time cookery, artistic, value added courses.

Finger Dexterity

This measures the fine motor ability and Co-ordination. In this study, the difference in the Fine Motor Co-ordination in the two groups is not significant.

This may be due to the fact that Homemakers are also well versed in the fine motor skills needed every day, like tailoring activities, nutrition programmers, Musical Instruments as hobby and relaxation.

Conclusion

Nowadays, people from all parts of the world are becoming more and more health conscious. Physical activity offers a broad range of benefits such as improves immunity, prevents illness, decreases fat mass and finally gives the body a toned shape.

The Body Mass Index was significantly lower in Working Women showing that physical activity reduces fat mass and has positive effect on muscle mass and bone density. The Working Women group showed higher Relative and Absolute $\dot{V}O_{2max}$ values for age compared to the Homemakers not engaged in any leisure-time physical activity which reflects the Cardiorespiratory fitness of the individual and thus cardiorespiratory endurance. The Muscular Strength was also significantly higher in Working Women. Flexibility and Fine Motor skills did not differ significantly in these Groups.

Physical Fitness has many and lifelong benefits and especially Women can and do Inculcate Physical Fitness as a Lifestyle. These results indicate that enormous public health benefits would accrue from the adoption of regular moderate-intensity exercise by those who are currently sedentary.

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