

CHAPTER

TWO

:

MATERIALS AND METHODS

A. MATERIALS

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B. METHODS (Experimental Procedures)

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c. Determination of Blood^tpressure

d. Determination of Oral^ttemperature

e. Determination of Physical fitness by
Step^ttest

C. PRECAUTIONS TAKEN DURING EXPERIMENTS



A) MATERIALS:

Present investigation is undertaken to know the physical fitness of the industrial workers. The factory chosen for the work was Kirloskar Hermetics Pvt.Ltd., Karad in Satara district. Total 160 physically active and healthy workers were selected. Their distribution in each group is given in Table 1. For easy observations and records, names of the individuals are avoided and their ticket numbers are given. Demonstrations of each and every method applied were given to the workers prior to the examination of workers.

a) SELECTION OF THE SUBJECTS:

For the present investigation, the company is chosen at small city like Karad in Satara district at Kirloskar Hermetics Pvt.Ltd., Karad. Here the employees are mainly from the rural areas near Karad. With managements permission, all the workers were first enlisted departmentwise. They were then catagorised according to their age in various age groups. They were divided into eight groups according to their age in years such as 21-25, 26-30, 31-35, 36-40, 41-45, 46-50, 51-55 and 56-60. Then, from each group healthy, regular, responsible workers were selected who also had a better nutritional status. All were from average economic family backgrounds. Workers selected from various departments of the factory, like Machine shop, tool room, washing, assembly, maintainance, development, stock despach and hydrolic departments. The 25 workers of each class except last two classes were chosen for the

examinations. From the classes 51-55 and 56-60 only five workers were selected due to their unavailability. (Table 1) Every worker was offered the examinations free of charge and their response rate was 100%.

All the examinations were carried out two hours before starting the work shift. Each and every individual was carefully and keenly examined. The observations were noted down correctly and neatly. The work was done in industrial premises at Kirloskar Hermetics Pvt.Ltd., Karad in Satara district.

b) PHYSICAL CHARACTERISTICS OF THE WORKERS:

Physical characteristics of the workers were firstly observed and noted in the charts. These charts were prepared groupwise. In these observations their body height and body weights were measured. The body heights are given in centimeters. Whereas, the body weights are given in kilograms. Weighing was carried out before lunch, for three successive days and the means were taken. The medical weight balance was used for weighing. They are recorded in Tables 2-9. Average age of ^{the} workers in each group is given in Table 1.

B) EXPERIMENTAL PROCEDURES:

In order to know the physical fitness of the workers it was necessary to know their various physical and physiological parameters. These parameters include their body height, body weight, resting heart rate, peak-expiratory flow rate, blood pressure both systolic and diastolic, oral temperature and finally the step

test were carried out.

All the equipments used were well known, recent, satisfactory, errorless, good conditioned, easy to use and handy. These instruments were tested by Shri. P.N.Saha, Ex.director, Central Labour Institute, Bombay., Mr. G.G.Narayane, Staff member of Industrial Physiology Division, Central Labour Institute, Sion, Bombay and Dr. V.A.Sawant Head of the department of Physiology, Shivaji University, Kolhapur. Before field-work these precautions were taken only to achieve correct and right assessment. All the examinations were carried out in factory environment in a well ventilated and lighted room having suitable area for each test.

a) DETERMINATION OF HEART-RATE:

Pulse rate per minute gives the heart-rate in beats per minute. Therefore, in order to know the heart-rate the pulse rate per minute is recorded, in resting condition before work. Subjects were asked to sit in a chair and pulse rate of the their right hand wrist were recorded. These observations gives their resting heart-rate heart,beats per minute.

b) DETERMINATION OF PEAK-EXPIRATORY-FLOW-RATE:

To know the peak-expiratory-flow-rate of the individual. Wright Peak Flow Meter (UK) was used. The subjects were tested in standing position. They were asked to expire speedily the expiratory air through the mouth-piece in the wright Peak Flow Meter. Three successive observations were taken and mean was written down. The peak expiratory flow rate of the individual was

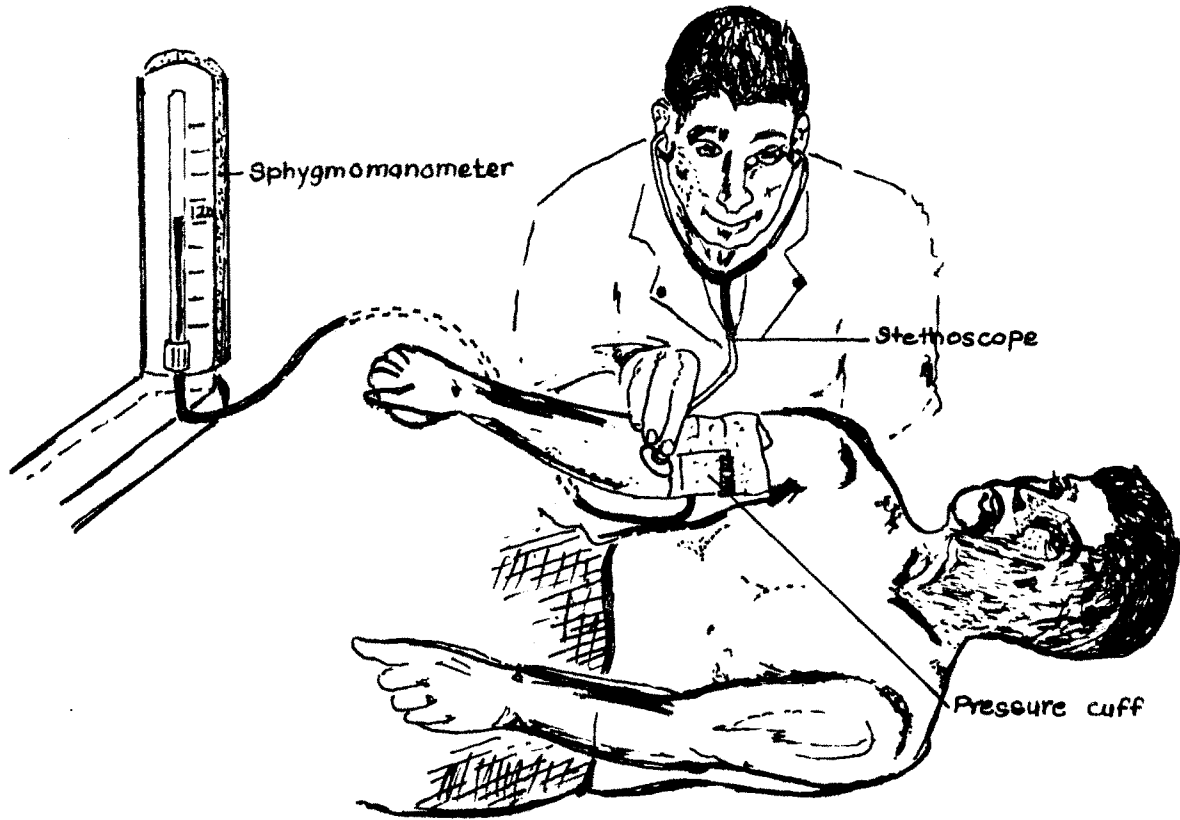
written down in liters per min. The mouth piece was cleaned everytime with dettol-water.

e) DETERMINATION OF BLOOD-PRESSURE:

The indirect (sphygmomanometer) method, which is commonly used in physical education and exercise physiology was used for the measurement of ^{blood} pressure. It involves a pressure cuff and a mercury manometer. The measurements were carried out in slipping condition of the workers. The cuff was placed around person's upper arm and should be approximately at heart level. Systolic blood pressure is the pressure needed to occlude the brachial artery, and it was found by listening (with a stethoscope) to the flow of blood just below the cuff. As the cuff pressure was gradually reduced, the pressure at which the sounds disappear or becomes muffled, was recorded as diastolic blood pressure. Mathematically, the difference between systolic and diastolic was referred to as the pulse pressure. The careful observations of blood pressure were written in terms of mmHg.

d) DETERMINATION OF ORAL-TEMPERATURE:

To avoid the fever conditions of the individuals the oral temperature of the individuals were also noted. The clinical thermometer was used for the measurement of oral temperature in terms of ⁰F. Oval-flat type thermometer was used for easy recordings. The workers were not allowed to chew tobacco or to smoke during the experiment.



Steps in taking blood pressure:

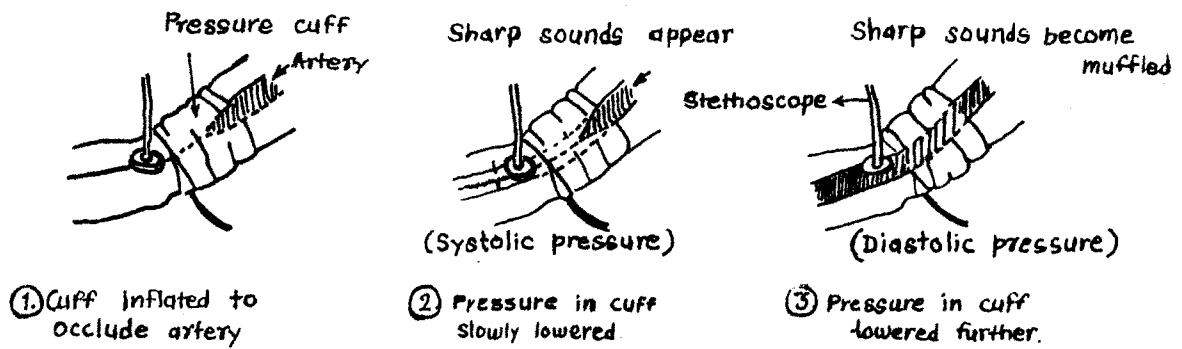


FIG NO. 1: Blood pressure determination by sphygmomanometer

e) DETERMINATION OF PHYSICAL FITNESS BY STEP-TEST:

The step test was originally developed in Harvard Fatigue Laboratory, U.S.A. to evaluate the physical fitness of an individual. This test had to be slightly modified so as to make it convenient for the short statured and the aged subjects and the modified step test is described below:

The test score which is computed from the pulse count taken during recovery after exercise, is a measure of individual's cardiovascular efficiency and can be made of use in grading men for their capacity for physical work in general and in hot environments in particular.

While carrying out the test, the subject steps up and down on a stool 45 Cm. high (the height of the stool in Harvard test is 51 Cms. or 20 inches approx.) at the rate of 30 complete steps per minute for a maximum period of 5 minutes or earlier in case of difficulty. The rate of stepping is regulated by a Metronome.

Immediately after the exercise is over, the subject is seated and his pulse is counted during the period of 1 min. to 1½ min. after exercise.

The fitness score is computed as follows:

$$\text{Score} = \frac{\text{Duration of stepping in seconds} \times 100}{5.5 \times (\text{half min. recovery pulse count})}$$

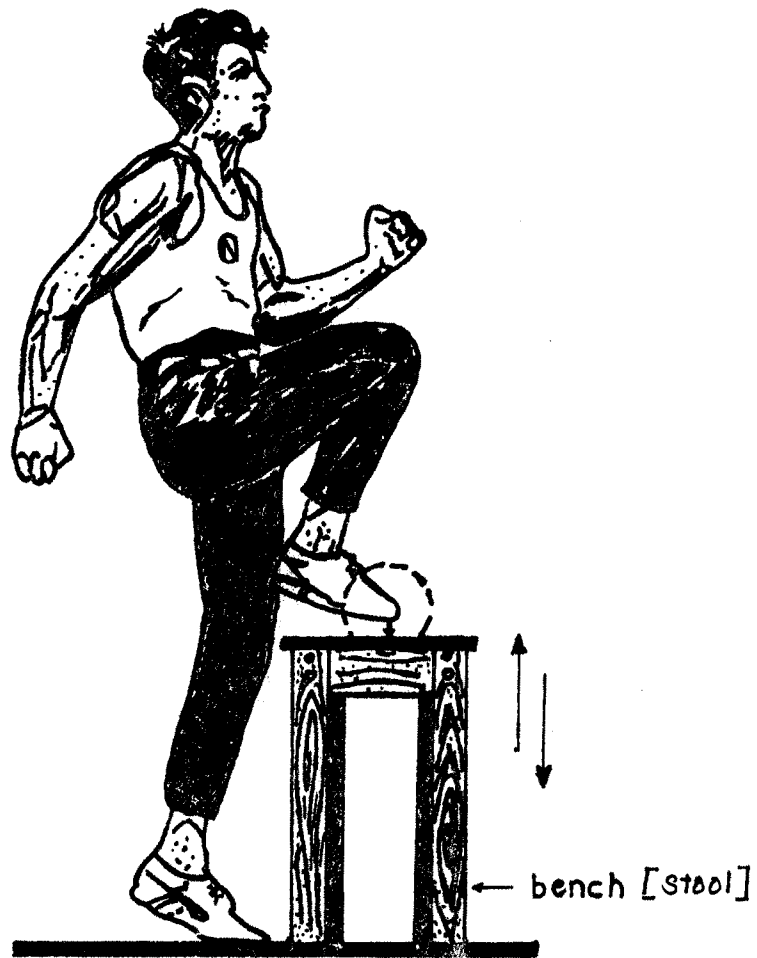


Fig. NO.2: Step test: A physical fitness test.

Garding of score is = Below 50 - - - Poor

50-65 - - - Low average

65-80 - - - High average

80-90 - - - Good

Above 90 - - - Excellent

Such gardings have been found to be well in agreement with actual physical performance of individuals.

Thus, to know the physical fitness of the workers the modified step test was carried out. As the Indian workers are short statured the height of the stool taken was less. For the test of the stool used was 36 cm. high, 45 cm. long and 35 cms. broad. As the height changed formula for score changed as below:

$$\text{Score} = \frac{\text{Duration of stepping in seconds} \times 100}{5.5 \times (\text{half min. recovery pulse count recorded})} \times 0.8$$

During the test the individuals those could not performed 5 minutes stepping were allowed to step 3 minutes or 4 minutes. Their half min. recovery pulse count were recorded and scores were calculated.

Table 1: Workers studied belonging to various age groups.

Sr. No.	Age Group	No.of Workers Examined	Average Age (Yrs.)
1)	21-25	25	22.15
2)	26-30	25	29.18
3)	31-35	25	32.94
4)	36-40	25	38.37
5)	41-45	25	42.11
6)	46-50	25	47.46
7)	51-55	05	52.14
8)	56-60	05	56.48
	Total	160	

c) PRECAUTIONS TAKEN DURING EXPERIMENTS:

- 1) All the subjects chosen were from rural area around Karad city. They were healthy & active.
- 2) To avoid further complications during recording the data ticket number & initials of workers were used.
- 3) They were catagorised according to age-groups and then examined four workers from each shift. Thus eight workers per day. Work was carried out for three days in a week.
- 4) Demonstrations of each and every method applied were given to the workeers.
- 5) All the examinations were carried out in resting conditions i.e. two hours prior to their work-shifts.
- 6) The body weights were noted without shoes and before lunch
- 7) Workers were not allowed to chew tobacco or cigarettee smoking during the examinations.
- 8) Mouth-piece of Peak-Flow-Meter and clinical thermometer were rinsed in dettol water and washed with distiled water.
- 9) Before starting the step-test, demonstrations of stepping were given. Workers were taught to adjust the steps with the rhythm of metronome and to maintain the rate of thirty compl-ete steps per minute.

- 10) Workers those were unable to carry out stepping for five minute, allowed for stepping less than five minutes.
- 11) Readings were repeated for confirmation and to avoid errors.