Materials and Methods

4.1. Selection of Subjects

During the period before the onset of technical civilization, physical fitness and performance were essential prerequisites for survival and successful existence. At present and from the aspect of the perspective development of our civilization the importance of physical fitness is pushed into the background; nevertheless adequate physical activity level is even today an important prerequisite for normal function of the organism as a whole.

Healthy, Indian boys and girls of age (13-15 years), free from any disease or history of cardio respiratory and hormonal abnormalities, limb injuries or any sorts of sustained illness and taking no medicine for sustained period, and also taking no medicine affecting muscle or bone growth, as well as, physical efficiency were included in the study from the populace of Staff Colony of Eastern Railway Workshop, Kanchrapara, Nadia, West Bengal, India. Besides, a group of Scouts and Guides, from Bharat Scouts & Guides, Eastern Railway State, Kanchrapara, Nadia, West Bengal, India, were also included in the study.

The study was conducted on 94 sedentary boys and 56 sedentary girls, as well as, 44 Scouts and 27 Guides, selected by random sampling method out of those who had volunteered for the study. The subjects, who did not have any exercise routine in their daily normal activities, were termed sedentary.
4.2 Design of the Study

To ascertain their cardio respiratory fitness, the physical (anthropometric measurements, body composition, etc.), and physiological (heart rate, blood pressure, haemoglobin content, etc.), parameters were measured as per standard protocol. Along with, nutritional statuses of all subjects were evaluated.

Then, the sedentary groups of all 94 boys have been divided into 2 (two) groups,

- sedentary control group (CB),
- sedentary experimental group (SB).

The sedentary group of 56 girls were divided, similarly, into 2 (two) groups –

- the sedentary control group (CG), and
- the sedentary experimental group (SG).

On the other hand, the 44 Scouts were termed as exercising boys’ group (EB) and 27 Guides were termed as exercising girls’ group (EG).

At the beginning of the study, for all the groups, the physical, physiological and physical activity (PFI by Harvard’s Step Test) status was determined. After that, the groups CB, CG, SB & SG were further analyzed, respectively depending upon their nutritional status viz a viz RDA [154] for Indians as per ICMR guideline (whether they were supplemented with adequate nutrition or not). Then, for the groups SB and SG, an exercise schedule as the exercise performed by the Scouts and Guides, was
designed. For the groups, EB and EG, no such exercise schedule was prepared, since they are already following an exercise schedule. The exercises are described below as *BP’s six exercises*. The subjects were asked to follow the schedules. Close monitoring, as far as possible, was continued for 6 (six) months. After 6 months, the physical and physiological status, as well as, physical activity levels of all the groups were evaluated and compared with their pre-experimental (6 months’ back) data.

**BP’s six exercises**

**I EXERCISE**

*For the Head:* Rub the head and face, firmly over several times with the palms and fingers of both hands. Thumb the muscles of the neck and throat.

**II EXERCISE**

*For the Chest:* From upright position bend to the front, arms stretched downwards, with back of the hands together in front of the knees. Breathe out. Raise the hand gradually over the head and lean back as far as possible, drawing a deep breath through the nose as you do. Lower the arms gradually to the sides, breathing out the word “Thanks” through the mouth. Lastly, bend forward again, breathing out the last bit of breath in you, and saying the number of times you have done it in order to keep count. Repeat this exercise 12 times.

**III EXERCISE**

*For the Stomach:* Standing upright, send out both arms, fingers extended, straight to the front, then slowly swing round to the right from the hips without moving the feet, and point the right arms as far round behind you as you can, keeping both arms level with, or a little higher than, the shoulders. Then, after a pause, swing slowly
round as far as you can to the left. Breathe in when pointing to the left. “Body twisting”. Breathe out when pointing to the right. Repeat six times, change the breathing to the other side and repeat six times.

**IV. EXERCISE**

**For the Trunk:** This is also called the “Cone Exercise”. Standing at “Attention” position, raise both hands, as high as possible over the head, and link fingers. Lean backwards, and then sway the arms very slowly round in the direction of a cone, so that the hands make a wide circle above and around the body, the body turning from the hips, and leaning over one side. Then to the front, then to the other side, and then back. After completing the circle, start in the opposite direction. Repeat six times both ways. Breathe in when leaning backward and breathe out when leaning forward.

**V. EXERCISE**

**For Lower Body and Back of Legs:** Stand with feet slightly apart, touch your head with both hands and look up into the sky, leaning back as far as you can, and then bend forward and downward till your fingers touch your toes, without bending your knees. Repeat 12 times.

**VI. EXERCISE**

**For Legs, Feet and Toes:** Stand in ‘Attention’ position, put the hands on the hips, stand on tip-toe, turn the knees outwards, and bend them slowly down to a squatting position, keeping the heels off the ground the whole time. Then gradually raise the body and come to the first position again. Repeat this 12 times. Breathe in as body rises and breathe out as the body sinks.
4.3. Anthropometric Measurements

Anthropometry comprises a series of non-invasive, inexpensive, and easy-to-perform methods for estimation of body composition. Changes in overall health and welfare of individuals and populations can result from the changes in body composition. Anthropometry is used to assess and predict performance, health and survival of individuals and reflect the economic and social well-being of populations. Anthropometry is a widely-used, inexpensive and non-invasive technique to measure the general effect of nutritional status on body composition of an individual or a population.

Body fat can be expressed in the terms of % body fat and can be used to make judgments about one's status relative to health and fitness. Lohman et al [128] recommended a range of 10-20% body fat as an optimal health and fitness goal for males. He indicated that, this range allows for individual differences in physical activity and preferences, and is associated with little or no health risk due to diseases associated with fatness. Values above 20% of body fat increases the risk of diabetes, heart diseases and hypertension. Values of 20-25% body fat are considered moderately high, 25-31% as high and more than 31% as very high. Females are generally about 3% fatter than males during pre-pubertal stage and about 11% fatter in post-pubertal stage. The optimal range of body fat for females is 15-25%, with 25-30% listed as moderately high, 30-35% as high and more than 35% as very high [127]. According to Lohman [127], the values for percent body fat that are below the optimal range are as follows: for boys, 6-10% is classified as low and below 6% as very low, comparable value for girls are 12-15% and below 12%. There
is a great pressure in our society to be thin, and this can carried to an extreme. A far too common problem in the high school and colleges is an eating disorder known as anorexia nervosa, in which young females have an exaggerated fear of getting fat. This fear leads to food restriction and increased exercise in an attempt to stay thin, when they are, in fact, already thin [113]. Bulimia nervosa is an eating disorder in which large quantities of food are taken in (binging), only to be followed by self-induced vomiting or the use of laxatives to rid the body of the food that was eaten (purging). While anorexia nervosa was characterized by the cessation of the menstrual cycle and the development of an emaciated state, the majority of the bingers/purgers are in the normal weight range [118].

So, it is very much important to assess the body composition, especially the % body fat to stay in optimal % body fat range, and, thereby, to maintain a good physique. Recent studies [145, 146, 153] have demonstrated the applications of anthropometry to include the prediction of who will benefit from interventions, identifying social and economic inequity, and evaluating response to interventions.
4.4  Body Mass Index (BMI)

Out of all the different anthropometric parameters, height and weight of the subjects were recorded with the help of an anthropometer and a weighing machine, respectively, each of which was calibrated every day before the start of the work. All the anthropometric measurements were taken, following the techniques recommended by Lohman et al [128]. The Body Surface Area (BSA) of the subjects was calculated by using the Mosteller formulae [105] and the BMI was calculated as per WHO norms [139, 140, 141, 144, 145, 148, 149]. Body Mass Index (BMI) is a simple ratio of weight-for-height that is commonly used to classify overweight and obesity in adults. It is calculated as the weight in kilograms divided by the square of the height in meters (kg/m²). BMI is age-independent and the same for both sexes [149].

i)  Body Mass Index = \[
\frac{\text{Body weight in kg.}}{\text{Body height in m}^2}
\]

ii) Body Surface Area = \[
\sqrt{\frac{\text{Height (cm) } \times \text{Weight (kg)}}{3600}}
\]
4.5 Body Composition

Body composition can be assessed on the basis of 4-component (mineral, water, protein and fat), 3-component (body water, protein + mineral and fat or body water + protein, mineral and fat) and 2-component (fat mass and fat-free mass) models [119].

The 4-component model is most accurate, but 2-component model is widely accepted, handy and fairly accurate. In this context, by the term body composition, we understand, the 2-component model, i.e., assessment of Lean Body Mass (LBM) comprising all tissues with the exception of depot fat which is the second main component [120].

LBM is, as compared with the total body weight, more closely related with a member of physiological variables such as oxygen consumption on the basal conditions and during different loads, cardiac output, vital capacity, respiratory volume, renal clearance, performance, etc. [120, 121, 122, 123, 124, 125]. As a result of the action of these different factors, during ontogenesis, on the development of body composition large individual differences are found in this respect even among subjects of similar age, height and body weight. Measurement of lean body mass and fat renders thus possible the evaluation of an important morphological and functional characteristic of the organism; moreover, LBM serves as one of the basic reference standards in addition to body weight, body surface area, etc., which do not always prove to be satisfactory especially from the view-point of energy metabolism during ontogeny. The role of skeletal muscle has been established as one of the
main factors which determine individual development and thus the whole process of evolution, and designated, in contrast to the energy rule of body surface, the "energy rule of the activity of skeletal muscles" (which represent the main part of LBM and which are hardly measurable in vivo).

The assessment of body composition was carried out by measuring skin-fold thickness from different sites. A skin-fold thickness (SFT) is defined as a measure of the double thickness of the epidermis, underlying fascia and subcutaneous adipose tissue. There are two main assumptions in determining total body fat from skin-folds:

- that there is a constant relationship between total body fat and subcutaneous fat at the sites measured. The equation of Siri (1961) [136] uses two-compartment model, such that the human body consists of fat mass (FM) and fat-free mass (FFM) and assumes that the density of the two compartments is constant between individuals at 0.90 g/cm$^3$ for FM and 1.10 g/cm$^3$ for FFM.

- that the density of FFM is constant.

Skin-fold measurements also assume that subcutaneous fat is a reliable indicator of total body fat and that skin-fold compressibility remains constant. Durnin and Womersley [107] validated the sum of four SFT (biceps, triceps, subscapular and suprailliac) against densitometry and devised sex and age dependent population-based linear regression equations estimate total body density. All SFT measurements were taken by the investigator from identical positions on each

The non-fat component of body composition is termed as fat free mass (FFM) and exists primarily as the chief structural and functional component of the human body. The FFM compartment consists in proportions of water (72%), protein (21%) and bone minerals (7%). The fat compartment of the body is termed as fat mass (FM) and will vary considerably among individuals in terms of absolute amount. Fat mass consists of 20% water and 80% adipose tissue and can, in obese persons be the largest component of the body.

The development of lean body mass (LBM) depends both on genetic factors (in humans especially during growth) as height and body build, and environmental stimuli (nutrition, physical activity, etc.). The number of fibres in skeletal muscles, which represent the main part of LBM is settled already during the 4th and/or 5th month of embryonic life [126] similarly as the ratio of white and red muscle fibres. Later changes in the absolute amount of LBM take place thus within a certain range determined genetically even when LBM and the depot fat ratio vary widely due to ontogenetical stages, environmental factors, etc. [129]. LBM itself changes as regards composition during ontogenesis: the ratio of LBM formed by internal organs, muscles, skeleton (which under normal conditions is a very constant part of LBM), differs during growth and in old age. During growth, i.e., period of high energy turnover, internal organs account for a significantly higher ratio than in any other stage of life. These metabolically highly active organs do not increase proportionately during growth and maturation as other parts of the body do. It has
already been reported [130] that the weights of liver, heart, spleen and adrenals in early stages of ontogenesis are higher in relation to the total body weight than that in later stages of life. This is not due to altered relations of LBM and body fat at different age period but applies also in relation to LBM of the organism [131]. The above organs form the highest proportion of LBM during the period of growth and this ratio declines with senility. From this ensures that not only the ratio of the main components of LBM and fat but also their composition changes during ontogenesis, in keeping with the general level of energy turnover.

A skin-fold calliper (Holtain skin-fold calliper, Model No. 2046F, Manufactured by Mitutoyo, Made in Japan) was used for skin-fold measurement purpose. To take the measurement, the skin is gripped about 1 cm. above the selected site and the calliper applied below this site, the grip is removed and the measurement noted to the nearest 0.2 mm. The calliper was then removed. This is repeated for three successive measurements, with the mean value calculated. Body density and percentage body fat is calculated using the equations of Durnin and Womersley [107], for each side of the body, using the following equations:

\[
\text{Density (g/cm}^3) = c - m (\log \text{SS});
\]

Where : D = Density, c & m = standard age and sex-specific coefficients, SS = Sum of all four skin-fold measurements (mm).

Once density is calculated, the Siri (1961) [136] equation is used to estimate percentage body fat:
Fat (%) = [(4.95 / D) – 4.5] × 100;

Where : D = Density, 4.95 & 4.5 are the constants calculated by Siri (1961) [136] using the assumptions on the density of FM and FFM.

Percentage body fat (PBF), Total body fat (TBF), Lean body mass (LBM), Fat mass (FM), Fat free mass (FFM), Fat mass index (FMI) and Fat free mass index (FFMI) were computed using following standard equations. [105, 106, 107, 136, 142, 143, 147, 150, 151, 152].

1) Total body fat (kg.) = [Body weight (kg.) × %Body fat] / 100.

2) Lean body mass = Total body weight – Total body fat.

3) FM (kg.) = (PBF / 100) × Weight (kg.)

4) FMI (kg/m²) = FM (kg.) / Height² (m)

5) FFM (kg.) = Weight (kg.) – Fat mass (kg.)

6) FFMI (kg/m²) = FFM (kg.) / Height² (m).
4.6 Nutritional Survey

The carbohydrate, fat, and protein nutrients consumed daily provide the necessary energy to maintain body functions both at rest and various forms of physical activity. Aside from their role as biologic fuel, these nutrients (called as macronutrients by nutritionists) also play an important part in maintaining the structural and functional integrity of the organism. In this chapter, emphasis is placed on their importance in sustaining physiologic functions.

Carbohydrates serve several important functions related to exercise performance. The main function of carbohydrate is to serve as an energy fuel for the body. It is important that, adequate amounts of carbohydrates are ingested routinely to maintain the body's relatively limited glycogen stores. If too, few carbohydrates are ingested, glucose is then obtained from glycogen breakdown and the carbohydrate reserves become depleted. In contrast, following a meal, excess carbohydrates may be readily converted to muscle and liver glycogen. Once the capacity of the cell for glycogen stores is reached, the excess sugars are converted and stored as fat. This action helps explain how body fat increases when excess calories in the form of carbohydrates are consumed. This process occurs even if the diet is low in fat. Carbohydrates also provide a "protein sparing" effect. Another function of carbohydrate is to serve as a "primer" for fat metabolism. Carbohydrate is essential for the proper functioning of the central nervous system. Under normal conditions and in short-term starvation, the brain uses blood glucose almost exclusively as a fuel and essentially has no stored supply of this nutrient.
Protein makes up about 12-15% of the body mass. Amino acids are essential building blocks of certain hormones and are needed for the activation of selected vitamins that play a key role in metabolic and physiologic regulation. Amino acids provide the major substance for the synthesis of cellular components, as well as, new tissue. Proteins also play an important role in regulating the acid-base quality of the body fluids. This buffering function is important during vigorous exercise when large quantities of acid metabolites are formed. Proteins are essential for muscle contraction; actin and myosin are the structural proteins that “slide” past each other as the muscle shortens during movement.

The most noteworthy functions of body fat include (a) providing the body’s largest store of potential energy, (b) serving as a cushion for the protection of vital organs, and (c) providing insulation from the thermal stress of cold environments. Fat constitutes the ideal cellular fuel because each molecule carries large quantities of energy per unit weight, is easily transported and stored and is readily converted into energy. At rest in well-nourished individuals, fat may provide as much as 80-90% of the body’s energy requirement. Fat content of the body constitutes approximately 15% of the body mass of males and 25% of females. Consequently, the potential energy stored in the fat molecules of an average college-aged male is about 1,00,000 calories.

Thirteen different vitamins have been isolated, analyzed, classified, synthesized, and recommended dietary intakes established. These vitamins are classified as fat-soluble and water-soluble. The fat-soluble vitamins are vitamins A, D, E, and K; the water-soluble vitamins are vitamin pyridoxine (B₆), thiamin (B₁), riboflavin (B₂), niacin
(Nicotinic acid), pantothenic acid, biotin, folic acid, cyanocobalamin (B$_{12}$), and ascorbic acid (C). Whereas vitamins contain no useful energy for the body, they generally serve as essential links to help regulate the chain of metabolic reactions that facilitate the release of energy bound in the food molecule and control the process of tissue synthesis. Because vitamins can be used repeatedly in metabolic reactions, the vitamin needs of athletes are generally no greater than the requirements of sedentary people.

Minerals tend to become incorporated within the structures and the working chemicals of the body. Minerals serve three broad roles in the body. Minerals provide structure in the formation of several bodily components, such as, bones and teeth, e.g. Calcium and Phosphorus.

The method selected for dietary assessment in research, depends on the purpose of the assessment, the available funding, and the burden. It is appropriate to impose on the response and the study. Commonly used methods include:

- A single 24 hour recall
- Multiply 24 hour recalls or multiply diet records
- Food frequency questionnaires
- Brief dietary screening tools

Food consumption data may be collected at the national, household or the individual level. Although data collected at the level of the individual are the most useful for assessing dietary adequacy and adherence to FBDG, Food supply and Household
data provide information, i.e., useful for many other purposes. Information regarding food availability at the household level may be collected by a variety of methods [109, 110]. Such data are useful for comparing food availability among different communities, geographic areas and socioeconomic groups, and for tracking dietary changes in the total population and within population sub-groups.

The following considerations will aid in selecting the method that will meet the survey objectives best: the foods or nutrients of primary interest; the need for group versus individual data; the need for absolute intakes versus relative intake estimates; population characteristics (age, sex, motivation, education / literacy, cultural diversity); the timeframe of interest; the level of specificity needed for describing foods; and available resources including food composition data if nutrients are to be calculated.

When absolute versus relative estimates of nutrient intakes are required, the food record and to our dietary recall are clearly the methods of choice for estimating mean intakes. These are the only methods that provide data on foods actually eaten, since both the food frequency questionnaire and the diet history are based on long-term subjective perception of a participant’s typical eating habits. A single day of intake per study participant is adequate for estimating group means, and a representative balance of all the days of the week should be included in the data collection, if possible. If the distribution of usual individual intakes within the groups is also needed, at least, two non-consecutive days of intake per individual are required to permit estimation of within-person day-to-day variability. The combination of days of the week for each individual should be seldom assigned.
A minimum three-four days of intake is generally required for characterizing usual individual intake of energy and the macro-nutrients [109]. If seasonal variability is a concern, collection of several days of intake in each season of the year is recommended. By liking the food intake data collection with weighing / measuring of children and the mother (to derive her BMI from a standard table) and with questions on the occurrence of illnesses in the past two weeks, one can gain an overall picture of the nutritional status of the children and of adults in the community, and whether the basic problems may be related more to feeding practices, to illnesses or to general food shortages. If dietary intake over a number of days is collected, the data begins to approximate and individual's usual intake. Thus, if enough days are collected on each individual, this could be an appropriate measure to use for research in which the individual's usual intake is the unit of interest [109].

As to how many days are needed, there has been extensive research on this topic [108, 109]. Generally, at least three of diet data are required for the most stable nutrient, percent of calories for fat. Other macronutrients require more, and micronutrients, such as, vitamin C and vitamin A, require many more days. Multiple days of diet records are considered by some, to be a gold standard for collection of individual dietary data. Standard diet survey questionnaire, as used by the National Institute of Nutrition and ICMR modified as per requirement, was used in collection of data. For this study and dietary survey was conducted in each family for a period of seven days. From these data, the nutritional status of each family was calculated with the help of food composition table [138].
4.7 Measurement of Resting Heart Rate

The subjects of the study were brought to the laboratory of the department of Human Physiology, University of Calcutta, in batches in the early morning hours and their resting pulse rate was measured by palpation after they had rested for 30 minutes. To measure the pulse at the wrist, the index and middle figure was placed over the underside of the opposite wrist, below the base of the thumb and pressed firmly with flat fingers until the pulse is felt.

Measuring the pulse can give very important information about our health. Any change from normal heart rate indicates a medical condition. Fast pulse may signal at infection or dehydration. In emergency situation, the pulse rate can help determine if the patient’s heart is pumping. The pulse measurement has other uses as well. During exercise or immediately after exercise, the pulse rate can give information about our fitness level and health.

Resting heart rates that are constantly high (tachycardia) may indicate a problem, and we should consult a health care provider. An irregular pulse can also indicate a problem. A pulse that is hard to feel may indicate blockages in the artery. These blockages are common in people with diabetes, or atherosclerosis from high cholesterol. Normal resting heart rates, range anywhere from 40 beats per minute, upto 100 beats per minute. Ideally, our resting heart rate varies between 60 to 90 beats per minute. The average resting heart rate for a man is 70 beats per minute, and for a woman is 75 beats per minute.
4.8. Measurement of Blood Pressure

Most devices for measuring blood pressure are dependent on one common feature, namely, occluding the artery of an extremity (arm, wrist, figure, or leg, etc.) with an inflatable cuff to measure blood pressure either oscillometrically, or by detection of Korotkoff sounds. The array of techniques available today owe their origins to the conventional technique of auscultatory blood pressure measurement, and these new techniques must indeed be shown to be as accurate as the traditional mercury sphygmomanometer.

No matter which device is used to measure blood pressure, it must be recognized that blood pressure is a variable hemodynamic phenomenon, which is influenced by many factors, not least being the circumstances of measurement itself. These influences on blood pressure can be significant, often accounting for rises in systolic blood pressure greater than 20 mm Hg, and if they are ignored, or unrecognized, hypertension will be diagnosed erroneously and inappropriate measurement instituted. The observer must be aware of the considerable variability that may occur in blood pressure from moment to moment with respiration, emotion, exercise, meals, tobacco, alcohol, temperature, bladder dissention, and pain, etc.

The systolic and diastolic blood pressure was measured as per standard protocol with the help of a digital sphygmomanometer [Manual Inflation Blood pressure Monitor (M2 model), Omron Health Care Co. Ltd., Japan]. Three successive recording were taken and the average of these was taken.
4.8.1 Method of Blood Pressure Measurement

With the blood pressure cuff deflated and the air valve closed, the cuff was wrapped around the subjects’ arm, and pumped up until the pressure read about 180 mmHg, which occludes the major arteries. The round end of the stethoscope (chest piece) was placed just beside (towards the palm) the blood pressure cuff, then slowly air was released by gently turning the air-valve. As the pressure slowly drops, the first sound of beating heart is heard, and the pressure on the dial was noted. That is the systolic blood pressure. As the pressure drops further, and the beating sound vanished, that was considered as the diastolic blood pressure. Then the air-valve is opened to release the remaining air from the cuff.
4.9 Measurement of Physical Fitness

The physical fitness level of the subjects was assessed by Modified Harvard Step Test, which was a modified version [111, 112] of the test developed by Brouha et al [110] in the Harvard Fatigue Laboratories during World War II. It is a type of Cardiac Stress Test for detecting and / or diagnosing cardio-vascular disease [116, 117]. It is simple to conduct, requires minimal equipment and gives a fairly good measurement of fitness, and our ability to recover after a strenuous exercise. The more quickly heart rate returns to resting, the better is the fitness level [114, 115]. Various studies have recommended that the height of the stool, as recommended, in the original protocol is too high for the Indian population as they have a low height in comparison to their European and American counterparts. It was also suggested that the height of the stool should also differ with respect to age, as well as, sex. So for this study, modified protocols were incorporated while conducting the Harvard Step Test in these group of subjects, as well as, sexes [132, 133, 134, 135].

Subjects from the study population were asked to volunteer for the study. The protocol [110, 111] and necessity of the experiment were explained to them and only, volunteers were chosen for the study. Subjects with any history of cardiovascular or respiratory problems were excluded for the study. The subjects stepped up and down on a stool at the rate of 30 complete steps per minute, keeping time to a metronome for duration of 5 minutes unless one stopped before, from exhaustion. The recovery pulse count were measured at 1-1\(\frac{1}{2}\), 2-2\(\frac{1}{2}\), 3-3\(\frac{1}{2}\) minutes of recovery. Physical Fitness was scored as :
PFI = (Duration of Exercise in second × 100) / [2 × (1-1/2 min., 2-21/2 min., 3-31/2 min. recovery pulse rates)]

4.10 Statistical Analysis

Statistical analysis [Student t Test, Test of significance, Correlation] [137] was performed to find out whether there is any significant difference in terms of development in health and performance among the subjected groups. The significance level was set at 0.05. Regression equations were also calculated for various correlated parameters. All statistical calculations were performed using SPSS version 12.0 for Windows.