CHAPTER - III

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3.1 Introduction: This chapter on methodology explains the design of the study in details so that it can help and guide the researcher to draw a logical scientific conclusion. In this part of study, it deals with sample, criteria measure, instruments used and administration of tests for personal measurements. To seek information and assessed the age at menarche, the age at which they started at regular participation in sports nutritional status, practice hours, particular games they play, the level of participation and irregular menstruation, monthly income and education level of parents—a questionnaire was designed which was standardized with the help of three independent experts—Dr. (Mrs) Krishna Bosu (Roy), MD, Associate Professor of Medicine, Calcutta Medical College and Hospital; Prof. Dr D. P. Pal, Department of Economics, University of Kalyani and Prof. Dr. Ranjana Roy, Department of Anthropology, University of Calcutta.

3.2 Procedural steps: This was a study under the category of descriptive survey of research in the field of Physical Education. In this survey the researcher collected the personal measurements and the selected parameters were assessed
through a standardized questionnaire to make an attempt to compare the age at menarche between athlete and non-athlete girls in relation to socio-economic status. Those were administered on different levels of athletes such as National, State, District, Sub-division and below Sub-division (Zonal). The data thus obtained have been computed through relevant statistical processes.

3.3 **Sample**: Data of this cross-sectional study were collected from May 2000 to Dec 2001. 597 girls between the age of 9 to 19 years used as a subject were randomly selected and divided into two groups – i) 348 non-athlete school going girls who had never participated in extracurricular sports in school at any level were selected from Kolkata and North 24 Parganas districts of West Bengal, which formed the controlled group ii) 249 Athlete schoolgirls specialised in six games—Athletics, Badminton, Basketball, Gymnastics, Swimming and Volleyball were selected from 11 districts of West Bengal. The subjects were classified according to their level of participation in National, State, District, Sub-division and below sub-division level (i.e. zonal level). National level is the highest level of participation whereas the Zonal level is the lowest level of participation in the present study.

3.4 **Design**: The data were collected in 2 (two) consecutive days from each subject as a particular school, coaching centre and
competition venue. On the first day, the subjects were asked to assemble in a room and their personal data and measurements—age, height and weight were taken and recorded. Thereafter the questionnaire was administered. They were instructed to come next day with clear idea about any confusion regarding any item of the questionnaire.

3.5 **Tools**: In order to collect the desired data for the study, the following tools were used—i) Weighing machine, ii) measuring steel tape, iii) Standardised. iv) Measured bowl, cup and spoon.

3.6 **Reliability of the data**: Reliability of the data was obtained by tester competency and instruments reliability.

3.6.1 **Tester competency**: All data for this study were collected by the investigator himself with the assistance of qualified Physical education teachers and coaches all information related to the questionnaire were collected by the investigator himself with the help of lady physical education teachers.

3.6.2 **Instruments Reliability**: A standard steel tape was used for the measurements of the study. The weighing machine used for measuring weight was tested for its accuracy by weighing and comparing the weight of the persons already weighed on a standard weighing machine and their reliability was confirmed. The reliability of standard questionnaires was
obtained through the opinion of three independent experts - Dr. (Mrs) Krishna Bosu (Roy), MD, Associate Professor of Medicine, Calcutta Medical College and Hospital; Prof. Dr D. P. Pal, Department of Economics, University of Kalyani and Prof. Dr. Ranjana Roy, Department of Anthropology, University of Calcutta.

3.7 Collection of Data:

3.7.1 Date of birth: Necessary information about their date of birth was obtained from subjects by personal interview. Later on it was confirmed from school registered/birth certificate/identity card supplied to them by the appropriate authority of the respective coaching centre/sports association. In most of the cases the exact date of birth was known and the age was rounded up in years (e.g., 8 years + months was taken as 9 years).

3.7.2 Age at menarche: Age at Menarche or Menarcheal age means the age in years at which the first onset of menstruation starts. According to Damon and Bajema (1974) recalled age at menarche is accurate enough for anthropological and epidemiological purposes. Keeping this method in mind in order to ascertain the age at menarche, subjects were asked to recall the exact date of menarche. In few cases they could not remember the exact date of menarche but month and year were reported clearly, in those cases they were asked to enquire and
confirm it from their mother and if possible accompanied her mother on the next day. Subsequently she was interviewed personally. There was hardly any problem to know the exact month and year of this event. The menarcheal age was rounded up in year. In the cases of Athlete girls, they were asked to recall regarding the time of their onset of menarche and whether it was before or after their participation in games and sports. Those who could not tell exactly the month & year of their menarche were excluded from this study. Again the menarcheal age was rounded up in year. There was a lady who always accompanied the data collection team to facilitate the study.

3.7.3 **Height**: Height is one of the criteria of this study. To assess the height and weight of Athletes and Non-athlete girls the following procedure was adopted for measurement of each subject. Subjects were instructed as advised by Wiener and Lourie to stand bare footed on a horizontal platform with the heels together, keeping back straight on a wall stretching upward to the fullest extent, aided by gentle upward pressure and encouraging her to stand tall. A flexible steel tape and a metal scale were used to get the measurement. The edge of the steel tape was placed on the ground vertically under the left heel from backside and the metal scale was pressed down to touch
the middle of the head lightly and the reading in nearest centimeter was recorded.

3.7.4 **Weight:** A portable calibrated Avery Spring Beam Balance was used for weighing the subjects in the present study. The athletes were interviewed at the time of their daily practice; naturally they have worn the light and suitable sports garments. The non-athletes girls have been measured at their school in the summer and they were informed previously the date of measurement and about the light school uniform which was needed. They responded accordingly. Their shoes were removed and the scale of the balance was checked every time for accuracy and the weight was recorded up to 0.5 kilograms.
3.7.5 *Nutritional assessment:* Each subject was shown a measured bowl, cup and spoon and said to remember the exact quality of food and drinks they intake and to report it next day. Afterwards calories and protein values were calculated from the chart framed by M. Swaminathan (Principle of Nutrition and Dietetics) and the value was calculated by dividing with the weekly food value into the daily value.

3.7.6 *Socio-economic condition:* It is very important to identify the socio-economic status of the subjects involved in Sports and Games. To make this attempt success the following items were covered in the questionnaire:

3.7.6.1 *Parents’ Education:* Educational backgrounds of the parents play an important role to the siblings into the sports arena. It is, therefore, an attempt to know the educational background of the parents as well as family status of the subjects—irrespective of athlete and non-athlete girls. They were asked regarding their parents’ academic qualification. Academic qualifications were classified into 7 stages i.e., Primary, Junior High, High, Higher Secondary, Graduate, Post-Graduate level and Technical level. Technical level means Engineering, Medical and Para-Medical etc.
3.7.6.2 **Monthly Income:** The questionnaire was designed in such a way that the subject can inform the investigator regarding their family income which includes parents’ monthly salary and salaries of other family members and income from any other sources, if any, viz., income from agriculture, business, security, debenture, share and from movable and non-movable property.

3.7.6.3 **Per Capita Monthly Income:** To get per capita monthly income the total number of family members divides family income in a month.

3.7.6.4 **Protein and Calorie Consumption:** An attempt was made to see the effect of protein and calorie consumption on the menarche for this study. This was done for both groups – Athlete and Non-athlete girls. Sports persons of this study generally used to get a major portion of Vitamins, Proteins and Calorie through their daily diet in training centers itself.

3.7.6.5 **Foods:** Each subject of this study consumes daily from morning to night and that was recorded in household measures (Cups, Spoonful, Bowlful) or simple units (slices of bread, chapatti, peeled banana, egg, fish, meat etc.) These measures were calibrated and devised through
weight of food. From food intake, the consumption of each of the nutrients was calculated. The intake of energy was written as kcal and protein as gm.

3.7.6.6 **Activity**: This study covers athlete girls specialist in 6 (six) disciplines i.e. Athletics, Badminton, Basketball, Gymnastics, Swimming and Volleyball. The data were collected at the time of their daily practice or during competition.

3.7.6.7 **Participation level and Practice hour**: Sportsperson engaged in vigorous and strenuous activity needs heavy practice for their highest level of performance. Daily practice hours were taken as a practice hour i.e loads. The level of competition viz., National, State, District, Sub-divisional and below subdivision (zonal) level has taken as participation level.

3.7.6.8 **Irregular Menstruation**: Every menstruating woman has a periodical cycle for her menstruation. Subjects, whose next menstruation starts between 25 to 30 days, have been defined as normal menstruation. But if this phenomenon happens earlier than 25 days or later than 30 days has been defined as Irregular menstruation cycle.
3.7.6.9 *Athlete Girls:* In this study the schoolgirls in the age group of 9 to 19 years who are preparing themselves or have taken part in various competition i.e. National, State, District, Sub-divisional and below subdivision (Zonal) level have been defined as athlete girls.

3.7.6.10 *Non-athlete Girls:* Schoolgirls, in the age group 9 to 19 years, who has never taken part in regular fashion in any sports and games or had not gone any preparatory coaching with a desire to participate in any competition, have been defined as non-athlete girls.