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### RESEARCH ARTICLE

#### A STUDY TO COMPARE FITNESS LEVELS BETWEEN FEMALE SPORTS PLAYERS OF PRE MENARCHE PHASE AND MENARCHE PHASE.

**Dr. Hitiksha Dedania<sup>1</sup>, Dr. Shweta Rakholiya<sup>2</sup>, Komal Bhalodia<sup>3</sup>, Shraddha Fichadiya<sup>4</sup>, Krishna Kasundra<sup>5</sup> and Pavitra Bhojani<sup>6</sup>.**

1. Assistant Professor, School of Physiotherapy, RK University, Rajkot, India.
2. Assistant Professor, School of Physiotherapy, RK University, Rajkot, India.
3. Intern, School of Physiotherapy, RK University, Rajkot, India.
4. Intern, School of Physiotherapy, RK University, Rajkot, India.
5. Intern, School of Physiotherapy, RK University, Rajkot, India.
6. Intern, School of Physiotherapy, RK University, Rajkot, India.

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#### Abstract

The average age of menarche has declined over the last century. The timing of menarche is influenced by female biology, as well as genetic and environmental factors, especially nutritional factors. Puberty is associated with increased body mass index, insulin resistance, total number of metabolic syndrome components and hence increased cardiovascular risk. girls with early menarche exhibit elevated blood pressure and glucose intolerance compared with later maturing girls, independent of body composition. Physical activity may lead to early puberty. So the study was aimed to compare the fitness levels in female sports players of pre menarche and menarche phase. 100 females were included in the study. Group 1 consisted of 50 females in pre menarche phase and Group 2 consisted of 50 females in menarche phase. Sits ups, quadrant jump, vertical jump, sit and reach and 3 min step test were performed in both the groups and compared. There was a significant difference observed in the results of pre menarche and menarche phase female sports players with later showing high strength, agility and flexibility. Thus menarche may be associated with higher physical fitness than pre menarche.

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#### Introduction:-

Menarche is the first menstrual cycle, or first menstrual bleeding, in female humans. From both social and medical perspectives, it is often considered the central event of female puberty, as it signals the possibility of fertility.

Puberty is the successive changes of anatomical and physiological characteristics in the early adolescence. <sup>(1)</sup>

Menarcheal age is influenced by heredity but the specific genetic determinants are largely unknown. Evidence for hereditary influences on the age at menarche comes from studies that show a trend for maternal age at menarche to predict daughter's age at menarche.

**Corresponding Author:-Dr. HitikshaDedania.**

Address:-Assistant Professor, School of Physiotherapy, RK University, Rajkot, India.

Body size parameters, such as weight or BMI and height are strongly correlated with the age at menarche. Higher subcutaneous fat levels and BMI at prepubertal ages (5-9 years) are associated with increased likelihood of early (<11 years) menarche. Age at menarche is negatively related to hip and thigh circumference and positively related to waist circumference.<sup>[6]</sup>

Early puberty is associated with increased body mass index, insulin resistance, total number of metabolic syndrome components and hence increased cardiovascular risk. Moreover girls with early menarche exhibit elevated blood pressure and glucose intolerance compared with later maturing girls, independent of body composition.<sup>[7]</sup> Physical fitness is a state of health and well-being and, more specifically, the ability to perform aspects of sports, occupations and daily activities. Physical fitness is generally achieved through proper nutrition, moderate-vigorous physical exercise, and sufficient rest.<sup>[2]</sup>

Fitness is more than just the ability to work longer; in fact, it includes a number of components, one of which is cardiorespiratory endurance. This is a measure of the circulatory and respiratory systems' ability to deliver oxygen and nutrients to and eliminate waste products from cells. Your cells need oxygen and nutrients in order to fuel your muscles during periods of physical activity. When your cells work they produce wastes that need to be transported away. How efficiently your body does these tasks is a measure of your cardiorespiratory endurance.<sup>[2]</sup>

Another component of physical fitness is muscular strength which is the "power" that helps you to lift and carry heavy objects. Without muscular strength, your body would be weak and would not be able to perform certain tasks in daily life.<sup>[2]</sup>

Endurance is the ability of your muscles to perform contractions for extended periods of time. Rather than just lifting or carrying something for a few seconds, the muscles are used for minutes.<sup>[2]</sup>

Flexibility training ensures that your body can move through its entire range of motion without pain or stiffness.<sup>[2]</sup>

Agility is the ability to change the body's position efficiently, and requires the integration of isolated movement skills using a combination of balance, coordination, speed, reflexes, strength, and endurance.<sup>[2]</sup>

**Hypothesis:****Null Hypothesis:**

No significant difference is seen in the physical fitness of girls in pre-menarche phase and menarche phase

**Alternate Hypothesis:**

Significant difference is seen in the physical fitness of girls in pre-menarche phase and menarche phase

**Methodology:-**

Study Design: Observational study

Study Setting: Primary Schools, Rajkot

Study Population: Menarche and Pre menarche girls

Study Sample: 100 female sports player

**Inclusion Criteria:**

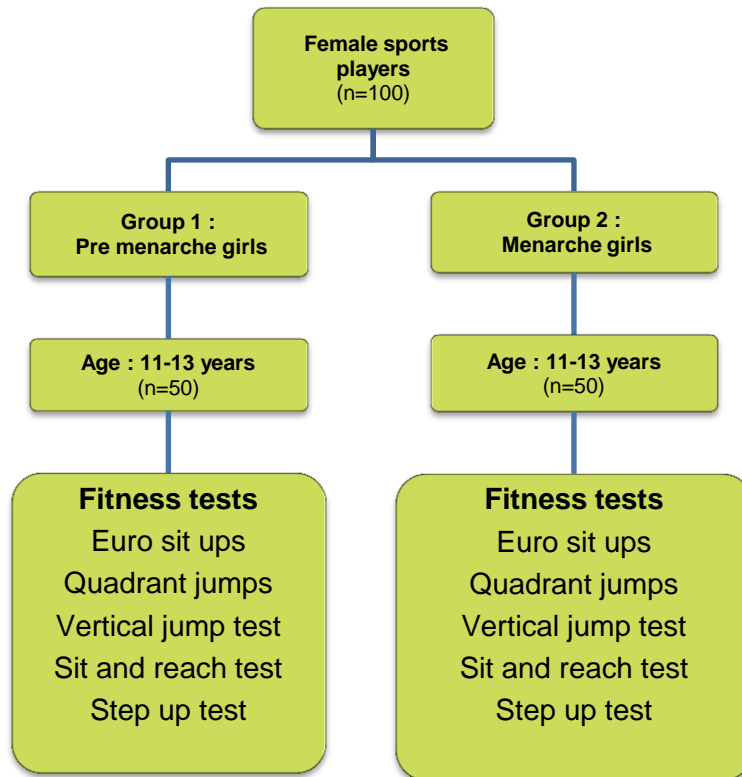
1. 11-13 years of age
2. Sports player
3. Group 1 – pre menarche girls
4. Group 2 – menarche girls

**Exclusion Criteria:**

Any kind of swelling ,edema ,fracture or any injury and disease in the whole body.

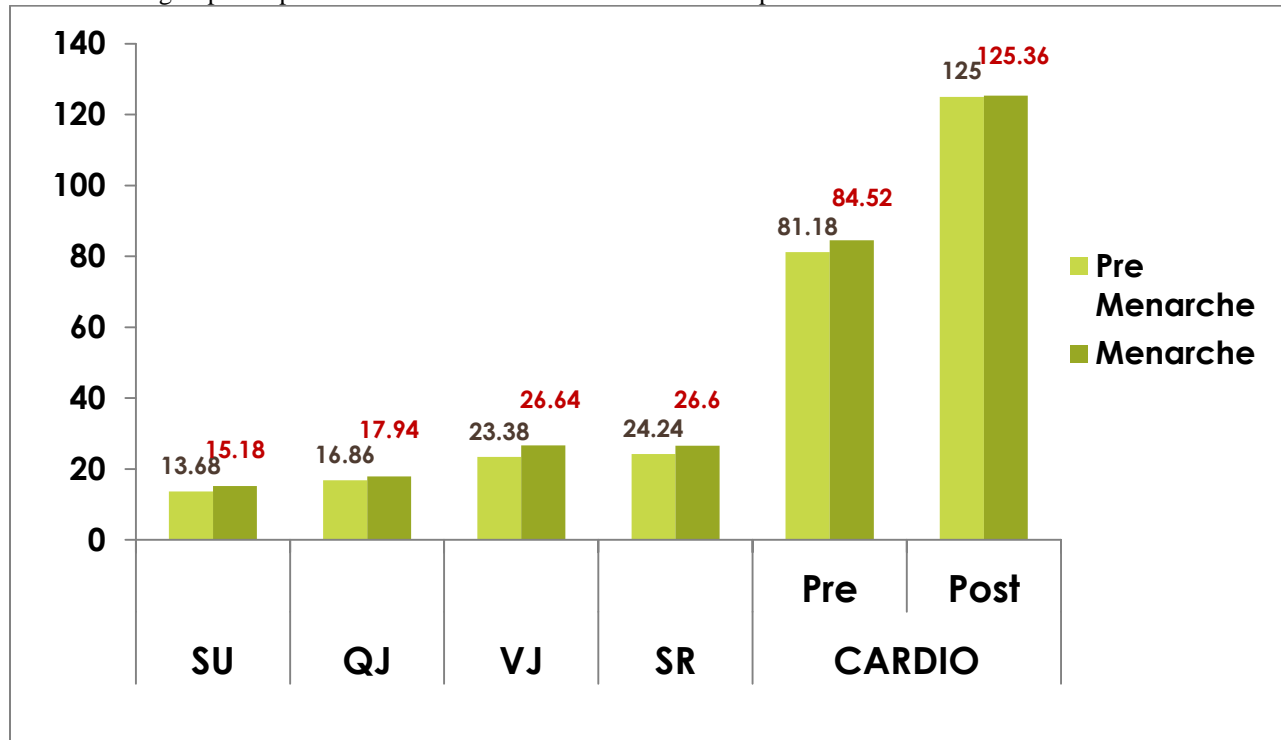
**Materials Required:**

Pen, Stop watch, measure tape, chalk

**Procedure:****Result:-**

Unpaired t test was used to compare the results of each fitness test between group 1 and group 2.

**Interpretation:** The p value for Sit ups (SU), Quadrant Jump (QJ), Vertical Jump (VJ) and Sit and Reach (SR) test was less than 0.05 which showed significant difference between pre menarche and menarche group. While there was no significant difference seen in the cardiovascular endurance between pre menarche and menarche group (p value > 0.05).

**Table 1:-**Intergroup Comparison of Pre menarche and Menarche Group**Discussion:-**

The aim of the study was to compare the fitness level of female sports players in pre menarche and menarche phase. The fitness tests were performed among 100 female sports players, out of which 50 were in pre menarche phase and 50 in menarche phase. Results showed there was a significant difference in the muscle strength, endurance, flexibility and agility. But there was no significant difference in the cardiovascular endurance. Thus, we reject the null hypothesis. Thus menarche has certain effects on the physical fitness of females.

According to Goswami in 2014, the pubertal growth and hence the physical fitness is directly and indirectly affected by the hormonal changes during this period.<sup>(1)</sup> Among the several fitness variables body composition, muscle strength and bone development have been found to be mostly affected by the puberty.<sup>(10)</sup>

According to Fard and colleagues in 2017, significant difference in physical fitness level in early and late puberty was due to natural grow and increase of muscle size and also, indicative of the lack of impact of puberty factor in drop of physical fitness level.<sup>(2)</sup>

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Estrogen up regulates the ability of muscles to contract by about 10%, with a peak in strength just before ovulation (Day MA in 2015). Improvements of heart size with greater aerobic fitness should occur due to increase in lung size, skeletal muscle mass, musclecappillarization.<sup>(1)</sup>

Menarcheal physical activity participation would be positively associated with lean mass and strength development.<sup>(3)</sup>

Puberty alters the aerobic fitness by increasing body size, dimension of the heart, lungs, muscles and circulatory system.<sup>(9)</sup>

The key factors of physical fitness development are growth, development, and the maturation rate ( Matejek in 2013).<sup>(4)</sup>

The limitations of the study included limited number of subjects and no specific sports was taken.

### **Conclusion:-**

The result of this study shows that menarche may be associated with higher strength, endurance, flexibility and agility.

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