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The study of the relationship between physical activity status and locomotor competence in rural and urban schoolchildren in Jammu district

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Abstract
Chronic inflammation is associated with several diseases, including cachexia, osteoporosis, diabetes, and cardiovascular conditions. Regular exercise is thought to possess anti-inflammatory properties, potentially through the regulation of toll-like receptor 4 (TLR4). This study aims to explore the relationship between TLR4, physical activity, age, and inflammatory biomarkers. Various methods, including behavioral observation, questionnaires, and physiological indicators like motion sensors and calorimetry, are used to measure physical activity. The study also examines the locomotor competence (speed and jumping abilities) of schoolchildren in rural and urban areas, using tools like the Baecke Questionnaire and the 50-yard dash test. Statistical analyses were performed using SPSS, with Pearson's Product-Moment Correlation used to explore relationships between variables.

Keywords: Chronic inflammation, physical activity, tlr4, exercise, locomotor competence, inflammatory biomarkers, speed ability, jumping ability

Introduction
Cachexia, osteoporosis, diabetes mellitus, and cardiovascular disease have all been linked to chronic inflammation. It has been suggested that regular exercise possesses "anti-inflammatory" qualities that might reduce chronic inflammation. We recently postulated that activity-induced regulation of inflammation could include toll-like receptor 4 (TLR4). Thus, the aim of this investigation was to ascertain the relationship between TLR4, age, physical activity level, and inflammatory biomarkers. McFarlane, Brian K., *et al*. (2006) [1]. Assessing physical activity in free-living people in an objective and trustworthy manner is necessary to get insight into the relationship between daily physical activity and health. In addition to being relevant to large populations, the approach should be able to assess physical activity across time periods that are indicative of everyday life and cause the least amount of discomfort to the individuals. Numerous methods exist for measuring physical activity, but they can be broadly divided into five groups: behavioral observation, questionnaires (such as diaries, recall tests, and interviews), and physiological indicators like motion sensors, heart rate, and calorimetry. To investigate the connection between physical activity and health, validated methods for calculating habitual physical activity are required. The absence of a suitable standard by which to compare approaches has been the biggest barrier to validating field methods of measuring human physical activity. Although there may be some value in the correlation between different field approaches, it is hard to ascertain the actual validity of any one of them in this regard due to the mistakes present in all of them (Montoye *et al*., 1996) [4]. However, the gold standard for validating field techniques of measuring physical activity is calorimetry, especially the doubly labeled water approach (Melanson and Freedson, 1996) [4]. Accordingly, skeletal muscle-driven movement of the body that requires the use of energy is referred to as physical activity (Caspersen *et al*., 1985) [2]. When measuring Total Energy Expenditure (TEE) in unrestrained individuals in their natural environment over a period of one to four weeks, doubly labeled water is a great tool (Speakman, 1997) [7]. The Physical Activity Index (PAI = TEE/BEE) or activity-induced energy expenditure (AEE = 0.9 times TEE − BEE) can then be used to quantify physical activity.

In participants eating an average mixed diet that satisfies energy needs, the computations assume that food-induced energy expenditure, the third component of TEE, is a constant percentage of 10% of TEE (Westerterp, 2003) [8]. One of the first techniques for measuring physical activity was behavioral observation. Direct data entering into a computer has led to its evolution (McKenzie, 2002) [3]. The most widely used instruments for measuring physical activity are activity questionnaires, which include interviews and diaries. The approach may be used to huge populations and is inexpensive. The validity and reliability of using questionnaires to evaluate habitual physical activity are low, even with their widespread use (Shephard, 2003) [6].

Selection of subject
The participants for this study were schoolchildren from the Jammu district, selected to assess relationship in locomotor competence between rural and urban populations.
A total sample size of 239 children was selected, with the distribution as follows:

- **Rural areas:** 118 schoolchildren
- **Urban areas:** 121 schoolchildren

Selection of variables
Locomotor competence
- Speed ability.
- Jumping ability.

Locomotor competence
Speed ability (50-yard dash test)
Objective: To assess the subject's speed.

- **Equipment:** Stopwatch.
- **Procedure:** The start and finish lines are designated by two lines 50 yards apart on the floor. The subject sprints from the starting line to the finish line as rapidly as possible after receiving the "Go" signal, which is accompanied by a downward sweep of the starter's arm as a visual cue. The timer(s) at the finish line record the time.
- **Scoring:** The score is the time taken from the start signal to the moment the subject crosses the finish line, rounded to the nearest tenth of a second.

Jumping ability (Standing broad jump test)
- **Objective:** To measure horizontal jumping ability
- **Procedure:** The individual stands behind the starting line, feet shoulder-width apart, weight equally distributed. To move forward, the person bends their knees and swings their arms while keeping their feet parallel. The distance is measured from the starting line to the closest point of touch after landing.
- **Scoring:** The score is the distance between the starting line and the nearest landing location. The best performance from several attempts is recorded as the final score.
- **Equipment:** Long jump pit, measuring tape, pen, and paper.

Physical activity status
The "Baecke Questionnaire," developed by Baecke, Burema, and Frijters (1984), was used to measure physical activity.

Statistical techniques
- **Comparative analysis:** An independent samples t-test was conducted to compare groups in the study.
- **Software used:** All statistical analyses were performed using SPSS (Statistical Package for the Social Sciences), version 20.0.
- **Significance level:** A significance level of 0.05 was set for hypothesis testing.

The current study utilized Pearson's Product-Moment Correlation method.

Results

Table 1: Pearson correlation coefficient for speed ability versus physical activity status

Parameter	Value
Pearson correlation coefficient (r)	0.01867
r^2	0.0003487
P-value	0.6149
Covariance	0.0193
Sample size (n)	728
Statistic	0.5033

The pearson correlation results showed a non-significant, very tiny positive connection between X (speed ability) and Y (physical activity status) (r =.0187, p =.615).

Calculation

$$\bar{x} = \frac{10.13+9.56+ \ldots +10.41+9.56}{728} = 9.9637$$

$$\bar{y} = \frac{7+11+ \ldots +12+12}{728} = 8.9766$$

$$\Sigma(x_i - \bar{x})^2 = (10.13-9.96)^2+(9.56-9.96)^2+ \ldots +(10.41-9.96)^2+(9.56-9.96)^2 = 209.0743$$

$$\Sigma(y_i - \bar{y})^2 = (7-8.98)^2+(11-8.98)^2+ \ldots +(12-8.98)^2+(12-8.98)^2 = 2700.603$$

$$\Sigma(x_i - \bar{x})(y_i - \bar{y}) = (10.13-9.96)*(7-8.98)+(9.56-9.96)*(11-8.98)+ \ldots +(10.41-9.96)*(12-8.98)+(9.56-9.96)*(12-8.98) = 14.0321$$

$$S_{XY} = \frac{\Sigma(x_i - \bar{x})(y_i - \bar{y})}{n - 1}$$

$$S_{XY} = \frac{14.0321}{728 - 1} = 0.0193$$

$$r = \frac{\Sigma(x_i - \bar{x})(y_i - \bar{y})}{\sqrt{(\Sigma(x_i - \bar{x})^2\Sigma(y_i - \bar{y})^2)}}$$

$$r = \frac{14.0321}{\sqrt{(209.0743*2700.603)}} = \mathbf{0.01867}$$

Fig 1: Graphical illustration of correlation result for speed ability in relation to their physical activity status

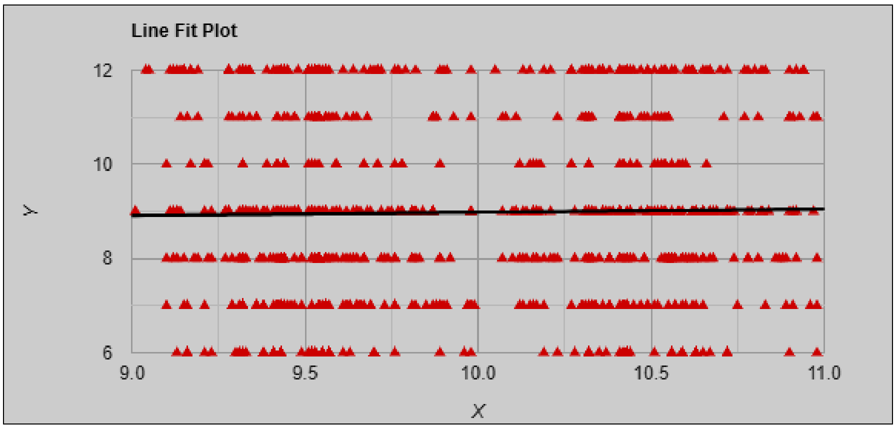

Fig 2: Scatter plot for speed ability vs. physical activity status

Table 2: Pearson correlation result for jumping ability in relation to their physical activity status

Parameter	Value
Pearson correlation coefficient (r)	-0.003314
r^2	0.00001099
P-value	0.9289
Covariance	-0.0004982
Sample size (n)	728
Statistic	-0.08931

The Pearson correlation results showed a non-significant, very tiny positive connection between X (jumping ability) and Y (physical activity status), r =−0.00331, p=.929.

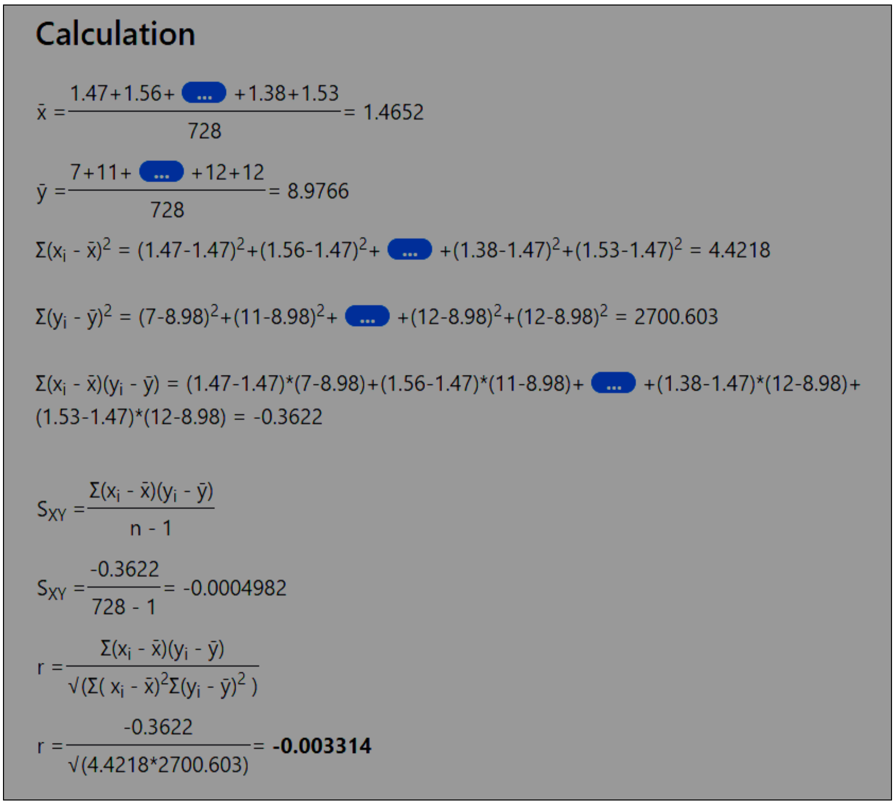

Fig 3: Graphical illustration of correlation result for jumping ability in relation to their physical activity status

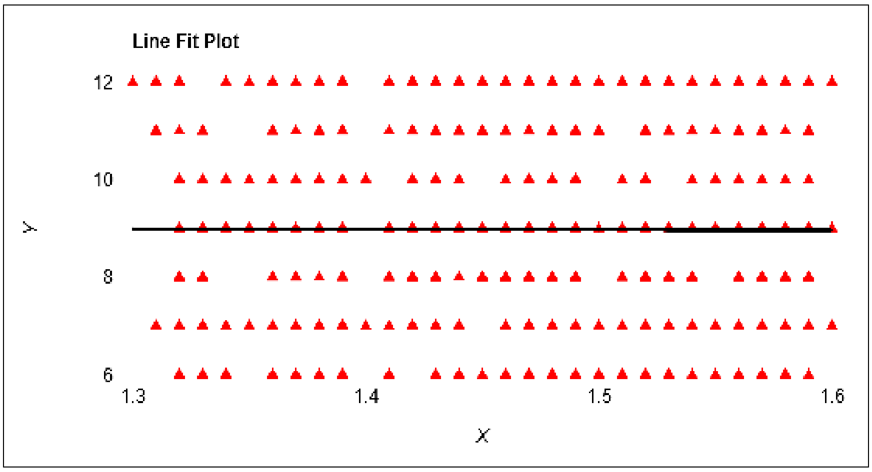

Fig 4: Scatter plot for jumping ability vs. physical activity status

Sampling technique

The methodology of purposive sampling, also referred to as judgment, selective, or subjective sampling, was utilized in this study. It is commonly assumed by researchers that through dependable estimation, a sample representative of the population can be acquired, thereby economizing time and resources in the selection of groups of subjects.

Ethical considerations

Ethical considerations were considered for the purpose of conducting this study. Throughout the data collection and presentation phases of the research, the investigator deliberated on the following principles:

- Honesty
- Objectivity
- Integrity
- Carefulness
- Openness
- Respect for intellectual property
- Confidentiality
- Responsible publication
- Responsible mentoring
- Respect for colleagues
- Social responsibility
- Non-discrimination
- Competence
- Legality
- Human subject protection

Conclusions

The present study aimed to compare the locomotor competence, specifically speed and jumping ability, of schoolchildren from rural and urban areas of Jammu district. The results indicated no significant differences between rural and urban schoolchildren in either speed or jumping ability. In terms of speed ability, the mean time for the 50-yard dash was similar between the two groups, with rural schoolchildren showing a mean of 9.96 seconds and urban schoolchildren 9.87 seconds. The statistical analysis (Independent samples t-test) revealed that the difference in speed ability was not statistically significant, as the computed t-value was less than the critical value at the 0.05 level of significance. Similarly, for jumping ability, there was no significant difference observed between the two groups, with the rural schoolchildren recording a mean of 1.47 meters and urban schoolchildren 1.47 meters in the standing broad jump test. The t-test analysis for jumping ability also yielded no significant difference. These findings suggest that, at least in the context of this study, environmental factors (rural vs. urban) do not appear to significantly influence the locomotor competence of schoolchildren in Jammu district. This highlights the need for further research that explores other variables, such as socioeconomic factors or access to physical activity opportunities, which may contribute to physical competence. Moreover, future studies could benefit from including a broader sample or considering additional components of physical fitness to provide a more comprehensive understanding of the determinants of locomotor competence in children

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