

THE RELATIONSHIP OF PROTEIN INTAKE AND HEMOGLOBIN LEVELS TO VO₂MAX IN 17–18-YEAR-OLD SOCCER ATHLETES

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ABSTRACT

VO₂max is a crucial indicator of an athlete's aerobic fitness, playing a role in supporting physical performance during soccer matches. An athlete's aerobic capacity is influenced by various factors, including protein intake and hemoglobin levels. Protein is essential for the formation and maintenance of body tissues and supports the synthesis of hemoglobin, which transports oxygen throughout the body. This study aimed to determine the relationship between protein intake, hemoglobin levels, and VO₂max in male soccer players aged 17–18 years at the Putra Mumbulsari Jember Club. This was an observational analytic quantitative study with a cross-sectional design, conducted in April 2026 at the Putra Mumbulsari Jember Club. The study sample consisted of 23 athletes selected using total sampling. Data on protein intake were obtained through 2×24-hour food recall interviews, and the mean value was calculated; hemoglobin levels were measured using an Easy Touch GcHb hemoglobin meter, while VO₂max was measured using the bleep test. Data analysis employed the Pearson correlation test to examine the relationships between variables. The results showed that the respondents' average protein intake was 48.2 g/day—classified as "inadequate" compared to the average requirement of 70.62 g/day—while the average hemoglobin level was 15.8 g/dL (classified as normal, >13 g/dL), and the average VO₂max was 41.3 ml/kgBW/minute (classified as a good value, >30 ml/kgBW/minute). Statistical analysis revealed no significant relationship between protein intake and VO₂max ($p = 0.99$; $r = 0.00$), showing a weak positive correlation; however, a significant relationship was found between hemoglobin levels and VO₂max ($p = 0.001$), showing a strong positive correlation ($r = 0.629$). The study concludes that hemoglobin levels are associated with VO₂max, whereas protein intake is not associated with VO₂max among 17–18-year-old soccer players at the Putra Mumbulsari Jember Club.

Keywords: *protein intake, hemoglobin, VO₂max, soccer athletes*