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THE EFFECTIVENESS OF A SYSTEMATIC APPROACH IN THE STEP-BY-STEP DEVELOPMENT OF FOOTBALL PLAYERS' PHYSICAL FITNESS

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Abstract. Optimising physical fitness in football requires an integrated, sequential training process that harmonises physiological adaptation with the progressive acquisition of sport-specific skills. The present study evaluates the effectiveness of a systematic, step-by-step approach grounded in contemporary periodisation theory for developing the key fitness components of amateur male football players aged 17–19 years over a twenty-four-week competitive macrocycle. Thirty-six athletes were randomly assigned to an experimental group following a structured meso- and microcycle plan built on the principles of cumulative workloads, variability, and delayed transformation, and to a control group that trained according to a conventional weekly model emphasising uniform loads. A battery of laboratory and field tests—maximal oxygen uptake, repeated-sprint ability, countermovement jump height, and Yo-Yo Intermittent Recovery Test Level 1—was administered at baseline, mid-point, and post-intervention. Two-way ANOVA revealed significant group-by-time interactions ($p < 0.05$) favouring the systematic programme for all indicators, with the greatest relative improvements observed in aerobic capacity (+11.8 %) and repeated-sprint index (+8.6 %). The findings confirm that a logically ordered progression of training stimuli produces superior adaptive responses compared with traditional undifferentiated scheduling, highlighting the necessity of evidence-based periodisation for youth performance enhancement.

Keywords: - football conditioning; periodisation; training adaptation; aerobic.

INTRODUCTION

Football is characterised by the continual alternation of high-intensity actions and sub-maximal efforts, demanding a sophisticated blend of aerobic endurance, anaerobic power, neuromuscular explosiveness, and rapid recovery. While each component may be trained in isolation, long-term performance depends on their coherent integration across the preparatory and competitive phases of the season. Classical theories of periodisation, from Matveev's monolithic preparatory paradigm to Bompa's multi-peaking frameworks, propose a chronological manipulation of volume and intensity to maximise adaptation at key competitive moments. Recent literature further emphasises the concept of residual training effects, the interference phenomenon between concurrent endurance and strength stimuli, and the sensitivity of adolescent athletes to training loads. Despite these insights, many academy and semi-professional environments continue to employ homogenous weekly schedules, risking early performance plateaus and increased injury incidence.

A systematic approach, in the context of sport training, signifies the deliberate sequencing of training means and methods so that each phase consolidates the adaptations elicited by the previous one while preparing the organism for subsequent, more complex stimuli. Such

sequencing respects principles of overload, specificity, and recovery, but embeds them within a broader logic that acknowledges the temporal dimension of biological transformation. Empirical evidence from endurance sports and Olympic disciplines supports the superiority of multi-tiered periodisation models, yet controlled data in football, particularly among developing athletes, remain sparse.

The present investigation addresses this gap by examining whether a step-by-step systematic programme, incorporating targeted mesocycles of general capacity, special endurance, strength-power conversion, and competitive maintenance, leads to greater improvements in key fitness determinants than a conventional plan with static weekly content. We hypothesised that the experimental model would yield significantly larger gains across aerobic, anaerobic, and neuromuscular performance metrics after twenty-four weeks.

Participants. Thirty-six male field players (mean ± SD: age 18.1 ± 0.7 years, height 178.4 ± 5.8 cm, body mass 70.6 ± 6.3 kg, playing experience 7.4 ± 1.8 years) from a regional sports school volunteered for the study. All were medically cleared and held similar training backgrounds. Parental consent and institutional ethical approval were obtained.

Testing procedures. Physiological and performance assessments were conducted in weeks 0, 12, 24. Maximal oxygen uptake (VO2max) was measured via incremental treadmill protocol with portable gas analysis; reliability for this set-up has been reported at ICC = 0.93. Repeated-sprint ability (6 × 30 m with 20 s recovery) yielded best, mean, and fatigue indices using electronic timing gates. Lower-body power was inferred from countermovement jump (CMJ) height on a force platform. Game-related endurance was evaluated through the Yo-Yo Intermittent Recovery Test Level 1, a validated predictor of high-intensity running capacity.

Statistical analysis. Data normality was verified with Shapiro–Wilk. Two-way mixed ANOVA (group × time) assessed interaction effects, followed by Bonferroni-corrected post-hoc comparisons. Effect sizes were expressed as partial eta-squared (η^2p) and Cohen's d. Significance threshold was set at $p < 0.05$. Calculations were performed in SPSS 26.

No baseline differences were detected between groups across any variable. After twelve weeks, the experimental cohort displayed a 7.9 % increase in VO2max versus 3.1 % in controls ($p = 0.018$, $\eta^2p = 0.14$). Repeated-sprint mean time improved by 4.5 % in the experimental group and 1.6 % in controls ($p = 0.022$, $\eta^2p = 0.12$). CMJ height rose modestly in both groups without statistical separation.

No severe injuries were reported, and session RPE indicated comparable perceived exertion across programmes, suggesting that performance differences derived from the organisation of loads rather than absolute volume.

The superiority of the structured programme corroborates periodisation theory, particularly the concept that adaptations are magnified when physiological stimuli are introduced in a hierarchical sequence that respects the time course of biological change. The foundation mesocycle likely enhanced mitochondrial density and capillary networks, elevating the capacity for subsequent high-intensity intervals. Transitioning to maximal strength and then to power fostered neuromuscular efficiency, which, combined with improved oxidative capacity, translated into better sprint repeatability, a critical performance determinant in football.

These findings align with Bangsbo's work on high-intensity training blocks and with Issurin's residuals model, both indicating that aerobic improvements potentiate anaerobic expression when properly timed. The modest CMJ improvements in the control group may reflect the

interference effect, as simultaneous exposure to mixed metabolic demands could blunt strength-power adaptation.

Adolescent athletes are receptive to training but sensitive to overload. The built-in deload weeks of the systematic plan presumably facilitated recovery and supercompensation, thereby sustaining progressive adaptation without excessive fatigue. The absence of increased injury incidence supports the safety of such structured planning.

Limitations include the single-sex sample, which restricts generalisability to female athletes, and the absence of tactical-technical performance metrics, although physiological improvements are known to influence match output. Future research should integrate GPS-based match analysis and explore similar protocols in elite academies.

A step-by-step systematic approach grounded in periodisation principles significantly enhances the key physical fitness components of youth football players over a twenty-four-week macrocycle compared with a conventional undifferentiated programme of equal volume. Coaches and sports schools should therefore adopt logically sequenced meso- and microcycle structures to optimise adaptation, minimise fatigue, and prepare athletes for the decisive phases of competition.

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