

Profiling the Intermittent Recovery Capacity of Under-16 Male Football Players using the Yo-Yo Intermittent Recovery Test Level 1

Tasha Appralo^{1*}, Dr. K. Rojeet Singh², Dipika Basumatary³, Umesh Mimi⁴, Dr. Hemant Gamre⁵

¹ Research Scholar, Department of Physical Education, Rajiv Gandhi University, Rono Hills, Arunachal Pradesh, India

² Assistant Professor, Department of Physical Education, Rajiv Gandhi University, Rono Hills, Arunachal Pradesh, India

³ Research Scholar, Department of Physical Education, Rajiv Gandhi University, Rono Hills, Arunachal Pradesh, India

⁴ Research Scholar, Department of Physical Education, Rajiv Gandhi University, Rono Hills, Arunachal Pradesh, India

⁵ Guest Faculty, Department of Sports Physiology, Rajiv Gandhi University, Rono Hills, Arunachal Pradesh, India

Appralotasha@gmail.com

Abstract: Purpose: The objective of this study is to conduct profiling of male football players under 16 years old in context of their intermittent recovery capability with the “yo-yo intermittent recovery test Level 1 (yo-yoir1)” model.

Methods: This study conducts “yo-yo intermittent recovery test” to determine the intermittent recovery potential of 16 male football players aged under 16 years old. This study employs descriptive statistics and normality test to determine the mean capacity and normality of the data.

Results: Male under-16 players demonstrated a mean intermittent capacity of 1862.22 ± 437.36 meters. Yo-yo IR1 distance ($p = 0.746$) was found to be normally distributed by the Shapiro-Wilk test.

Conclusion: The profiling results show a decent intermittent recovery performance, which is crucial for match performance. To improve physical performance, the coach and trainer need to train the players with a concentrated physical conditioning plan to cope with the demands at the elite level and for the older group.

Keywords: Yo-Yo IR 1, Intermittent activity, Profiling,

INTRODUCTION

Football is a complex sport; to compete at the top level, a player must possess a range of technical, tactical, and physical skills, as well as anthropometric traits (Mujika et al., 2009; Ingebrigtsen et al., 2014). The capacity to engage in intermittent high-intensity activities is crucial, according to research on football and other team sports like basketball and handball (Deprez et al., 2012). During elite-level competition, actions such as jumping, twisting, sprinting, and high-speed running occur every 3 to 5 seconds (Krustup et al., 2006). It is expected of both male and female athletes to have high levels of agility in addition to well-developed anaerobic power and aerobic capacity (Emmonds et al., 2019).

Football players must frequently engage in high-intensity bursts of action interspersed with moderate-intensity rest intervals over extended match duration, making it an incredibly physically taxing sport (Modric et al., 2021). Maintaining high-intensity training activities for longer time is one of the major features of competitive performance (Castagna et al., 2009). Football-specific endurance, or the capacity to exert high-intensity effort, is an essential physiological prerequisite for peak football performance (Doncaster et al., 2018).

The “yo-yo intermittent recovery models”, which are more appropriate for assessing the physical abilities needed in football, have replaced the conventionally used continuous activity tests as training methods have advanced (Deprez et al., 2014). It has been demonstrated that the “yo-yo intermittent recovery test level 1 (yo-yo ir1)” is effective and dependable for evaluating an individual's intermittent endurance capacity (Becerra et al., 2025). This test provides a more useful and effective substitute for laboratory-based techniques that coaches frequently employ to track football players' physical fitness (Ingebrigsten et al., 2012). For assessing football players' intermittent endurance, the yo-yo ir1 offers higher validity, is more affordable, efficient, and easily accessible (Markovic & Mikulic, 2011; Boullosa et al., 2012).

Over the years, a substantial number of studies have been conducted on these field-oriented assessments, such as the “yo-yo ir1 and yo-yo ir2,” to investigate various factors influencing players in intermittent sports like football (Chaouachi et al., 2010). The “yo-yo intermittent recovery test level 1 (yo-yo ir1)” has been used widely as an alternative to laboratory-based methods for testing the intermittent capacity of players (Krustrup et al., 2015). Earlier research

has focused on the benefits of the yo-yo ir1 and other field-based testing methods (Castagna et al., 2009).

This study is primarily aimed to explore the intermittent capacity and profiling of under-16 football players from Arunachal Pradesh. While various studies have been conducted and the importance of such assessments has been highlighted in relation to football players, no such study has yet been conducted on players from Arunachal Pradesh, located in the far east of India.

METHODOLOGY

Study design:

This study adopts a “cross-sectional research design” and descriptive approach to measure the intermittent endurance capacity of male under-16 football players using the “yo-yo intermittent recovery test level 1 (yo-yo ir 1)”. This research design was employed, and all measurements for the test were taken during a single session without any intervention or follow-up.

Study setting:

The study was conducted prior to the hangpaan dada state-level football tournament in Itanagar, Arunachal Pradesh, India. All the testing was conducted on natural grass between 8:00 and 10:00 am by minimising the influence of the environment and weather for all the players at Jubille Ground, Lohit District.

Participants:

A total of 16 male football players are set to represent Lohit district at the Hangpan Dada State Level Football Tournament. Participants were selected using the total enumeration(census) sampling technique.

Inclusion criteria:

- Registered football players of the district football association.
- Players set to participate in the upcoming hangapan dada memorial state level football tournament.
- Male football players aged under 16 years.

- Healthy and medically fit.
- Written form of par-q and consent obtained from the parents.

Exclusion criteria:

- Players with current or major injury.
- Players who didn't get parental consent.

Ethical consideration:

All the stakeholders were given proper explanation of the study's purpose and written consent and the "Physical Activity Readiness Questionnaire (PAR-Q)" were obtained from the players and the parents before the commencement of the study. Confidentiality was maintained throughout the study.

Anthropometric measurement:

Height and body weight of the players were taken before commencing the testing procedure using a portable stadiometer and calibrated digital weighing scale set to the nearest 0.1cm and 0.1 kg. All measurements were taken barefoot and while wearing lightweight clothing.

Test equipment:

- Lipad for yo-yo ir 1 recording
- Speaker
- Measuring tape
- Chalk powder for marking
- Digital weighing scale
- Portable stadio meter
- Recording sheets
- Stopwatch

Test protocol:

Testing was performed on natural grass, with players wearing proper football kits and studs. Before starting the testing procedure, the players were instructed to do a proper warm-up for 10 to 15 minutes, including a dynamic warm-up. Players followed the audio played by the instructor. The test commenced with the players performing a 20-meter repeated shuttle run under the scrutiny of the instructor and volunteers. Each shuttle consists of a total 40-meter distance with an active recovery period of 10 seconds. During that period, they can jog or walk inside the restricted “5-meter zone” before returning to the starting line for the next round.

The speed of the running increased progressively with an audio sound for every round. The test ends for a player when they fail to reach the starting/finish line before the resting period on two consecutive occasions. The total round finish is recorded, and later it is converted to the distance covered.

Outcome variables:

The primary outcome variable of the study is to measure the intermittent recovery capacity of the player and the participant characteristics, which include height(cm) and weight (kg).

Data collection:

A single testing session was conducted for data collection. Anthropometric tests for height and weight were taken before proceeding with the YOYO intermittent recovery test. All data were recorded in a spreadsheet after completion of the test for each individual and later transferred to Microsoft Excel for statistical analysis.

Statistical analysis

Data were analysed using IBM SPSS.

The Shapiro-Wilk normality test was employed to check the normality of data, and descriptive statistics were employed to assess the mean and standard deviation of the yo-yo ir1 test and anthropometric measures. The level of statistical significance was set at 0.05.

RESULT

Table 1: Participant characteristics

Variable	Mean $\pm$ sd	Minimum	Maximum
Height (cm)	164.37 $\pm$ 5.20	157.00	173.00
Weight (kg)	59.00 $\pm$ 7.19	49.00	76.00

Interpretation:

Table 1 presented descriptive information for weight, and height. The average height and weight of the subjects were 164.37 ± 5.20 cm and 59.00 ± 7.19 kg, respectively.

Table 2: YO-YO IR 1 Performance

Variable	Mean $\pm$ sd	Minimum	Maximum	Shapiro-wilk (w)	P-value
Yo-Yo Distance(Meter)	1862.22 $\pm$ 437.36	1120	2920	.967	.746

Interpretation

The mean of yo-yo ir1 distance was 1862.22 ± 437.36 meters. Yo-Yo ir1 distance ($p = 0.746$) was found to be normally distributed by the shapiro-Wilk test.

DISCUSSION

This study was majorly aimed to profile the under-16 football players of the district and to assess intermittent recovery capacity using the yo-yo ir1 test.

There are limited opportunities to compare the results of our study related to under-16 football players with the existing body of literature with some comparisons. For example, the under-16 male players of our study have considerably better performance scores (18622 ± 437) than those of age-matched Croatian football players (1538 ± 428). High levels of young athlete's performance were compared at intermittent endurance level (Mikulic & Markovic, 2011).

In endurance sports, where oxygen must always be available to release energy from muscle materials, aerobic endurance is essential. The “yo-yo ir1” test is chosen because it is considered to be useful approach to determine physical reactions of younger soccer players (Karabulak & Ozcan, 2024). From an energy perspective, players with higher maximum oxygen absorption capacity (VO₂ max) have larger glycogen reserves for executing for longer time at high level of intensity. Additionally, they have the greatest amount of high-speed running lengths and faster recuperation times (Myftiu, 2019).

The correlation between the high-intensity training and “yo-yo ir1” performance was significant during a competitive game, which has been an indication of the endurance performance during the football match (Bangsbo et al., 2008).

Overall, this study bridges the gap and provides a meaningful insight into the intermittent recovery capacity of the under-16 football players of Lohit district of Arunachal Pradesh.

CONCLUSION

This profiling study demonstrates the current status of Intermittent recovery capacity of under-16(male) football players of Lohit district as assessed by the intermittent recovery test 1, i.e, Yo-Yo IR1. This normative data will be an asset for the coaches and trainers in taking the future course of action. This data/result can be taken as a norm for the initial phase in making significant changes to uplift the performance of our state football players and be generalised to others to some extent as required.

Future research should incorporate teams from the state and nation as a whole so as to take a greater leap towards development and growth of football in the state and nation as a whole. Researchers can conduct the study by taking more samples and on a gender basis.

References

1. Bangsbo, J., Iaia, F. M., & Krstrup, P. (2008). The Yo-Yo intermittent recovery test: a useful tool for evaluation of physical performance in intermittent sports. *Sports medicine*, 38(1), 37-51.
2. Becerra Patiño, B. A., Montenegro Bonilla, A. D., Paucar-Urbe, J. D., Rada-Perdigón, D. A., Olivares-Arancibia, J., Yáñez-Sepúlveda, R., López-Gil, J. F., & Pino-Ortega, J. (2025). Characterization of Fitness Profiles in Youth Soccer Players in Response to

- Playing Roles Through Principal Component Analysis. *Journal of Functional Morphology and Kinesiology*, 10(1), 40. <https://doi.org/10.3390/jfmk10010040>
3. Boullosa, D. A., Nakamura, F. Y., Perandini, L. A., & Leicht, A. S. (2012). Autonomic correlates of Yo-Yo performance in soccer referees. *Motriz: Revista de Educação Física*, 18, 291-297.
 4. Castagna, Carlo^{1,2}; Impellizzeri, Franco³; Cecchini, Emilio¹; Rampinini, Ermanno⁴; Alvarez, José Carlos Barbero⁵. Effects of Intermittent-Endurance Fitness on Match Performance in Young Male Soccer Players. *Journal of Strength and Conditioning Research* 23(7):p 1954-1959, October 2009. | DOI: 10.1519/JSC.0b013e3181b7f743
 5. Chaouachi, Anis; Manzi, Vincenzo; Wong, Del P; Chaalali, Anis; Laurencelle, Louis; Chamari, Karim; Castagna, Carlo. Intermittent Endurance and Repeated Sprint Ability in Soccer Players. *Journal of Strength and Conditioning Research* 24(10):p 2663-2669, October 2010. | DOI: 10.1519/JSC.0b013e3181e347f4
 6. Deprez, D., Coutts, A. J., Lenoir, M., Fransen, J., Pion, J., Philippaerts, R., & Vaeyens, R. (2014). Reliability and validity of the Yo-Yo intermittent recovery test level 1 in young soccer players. *Journal of Sports Sciences*, 32(10), 903–910. <https://doi.org/10.1080/02640414.2013.876088>
 7. Doncaster, G., Scott, M., Iga, J., & Unnithan, V. (2018). Reliability of heart rate responses both during and following a 6 min Yo-Yo IR1 test in highly trained youth soccer players. *Science and Medicine in Football*, 3(1), 14–20. <https://doi.org/10.1080/24733938.2018.1476775>
 8. Deprez, D., Vaeyens, R., Coutts, A. J., Lenoir, M., & Philippaerts, R. (2012). Relative age effect and Yo-Yo IR1 in youth soccer. *International journal of sports medicine*, 33(12), 987-993. DOI: 10.1055/s-0032-1311654
 9. Deprez, D., Coutts, A. J., Lenoir, M., Fransen, J., Pion, J., Philippaerts, R., & Vaeyens, R. (2014). Reliability and validity of the Yo-Yo intermittent recovery test level 1 in young soccer players. *Journal of Sports Sciences*, 32(10), 903–910. <https://doi.org/10.1080/02640414.2013.876088>
 10. Emmonds, Stacey; Nicholson, Gareth; Begg, Clive; Jones, Ben; Bissas, Athanassios. Importance of Physical Qualities for Speed and Change of Direction Ability in Elite

Female Soccer Players. *Journal of Strength and Conditioning Research* 33(6):p 1669-1677, June 2019. | DOI: 10.1519/JSC.0000000000002114

11. Ingebrigtsen, J., Bendiksen, M., Randers, M. B., Castagna, C., Krustup, P., & Holtermann, A. (2012). Yo-Yo IR2 testing of elite and sub-elite soccer players: Performance, heart rate response and correlations to other interval tests. *Journal of Sports Sciences*, 30(13), 1337–1345. <https://doi.org/10.1080/02640414.2012.711484>
12. Ingebrigtsen, Jørgen^{1,2}; Brochmann, Marit³; Castagna, Carlo⁴; Bradley, Paul S.⁵; Ade, Jack⁶; Krustup, Peter^{2,7}; Holtermann, Andreas⁸. Relationships Between Field Performance Tests in High-Level Soccer Players. *Journal of Strength and Conditioning Research* 28(4):p 942-949, April 2014. | DOI: 10.1519/JSC.0b013e3182a1f861
13. Karabulak, A., & Özcan, S. (2024). Examining the Relationship Between Yo-Yo Intermittent Rest Test Results and Performance in Football Players. *Turkish Journal of Sport and Exercise*, 26(2), 230-235. <https://doi.org/10.15314/tsed.1496858>
14. Krustup, P., Mohr, M., Nybo, L., Jensen, J. M., Nielsen, J. J., & Bangsbo, J. (2006). The Yo-Yo IR2 test: physiological response, reliability, and application to elite soccer. *Medicine & Science in Sports & Exercise*, 38(9), 1666-1673.
15. Krustup, P., Bradley, P. S., Christensen, J. F., Castagna, C., Jackman, S., Connolly, L., ... & Bangsbo, J. (2015). The Yo-Yo IE2 test: physiological response for untrained men versus trained soccer players. *Medicine and Science in Sports and Exercise*, 47(1), 100-108.
16. Markovic, Goran; Mikulic, Pavle. Discriminative Ability of The Yo-Yo Intermittent Recovery Test (Level 1) in Prospective Young Soccer Players. *Journal of Strength and Conditioning Research* 25(10):p 2931-2934, October 2011. | DOI: 10.1519/JSC.0b013e318207ed8c
17. Mikulic, P., & Markovic, G. (2011). Discriminative Ability of The Yo-Yo Intermittent Recovery Test (Level 1) in Prospective Young Soccer Players. *Journal of Strength & Conditioning Research*, 25(10), 2931–2934. <https://doi.org/10.1519/JSC.0b013e318207ed8c>

18. Modric, T., Versic, S., & Sekulic, D. (2021). Relationship Between Yo-Yo Intermittent Endurance Test-Level 1 and Match Running Performance in Soccer: Still on the Right Path?. *Polish journal of sport and tourism*, 28(4), 16-20.
19. Mujika, I., Santisteban, J., Impellizzeri, F. M., & Castagna, C. (2009). Fitness determinants of success in men's and women's football. *Journal of Sports Sciences*, 27(2), 107–114. <https://doi.org/10.1080/02640410802428071>
20. Myftiu, A. (2019). The impact of different play positions on some morphological indicators from the Yo-Yo IR1 test in young football players. *Sport and Health International Journal of Sport Sciences and Health*, 6(11–12), 31–35.
21. Silva, C. D. D., Natali, A. J., Lima, J. R. P. D., Bara Filho, M. G., Garcia, E. S., & Marins, J. C. B. (2011). Yo-Yo IR2 test and margaria test: validity, reliability and maximum heart rate in young soccer players. *Revista Brasileira de Medicina do Esporte*, 17, 344-349. <https://doi.org/10.1590/S1517-86922011000500010>
22. Sparks, M., Coetzee, B., & Gabbett, J. T. (2016). Yo-Yo Intermittent Recovery Test thresholds to determine positional internal match loads of semiprofessional soccer players. *International Journal of Performance Analysis in Sport*, 16(3), 1065–1075. <https://doi.org/10.1080/24748668.2016.11868948>