

Impact of french contrast training on field hockey player's biomotor and physiological parameters: a pretest-posttest study

Impacto del entrenamiento de contraste francés en los parámetros biomotores y fisiológicos de los jugadores de hockey sobre césped: un estudio pretest-posttest

*Ibnu Noufal K V, **G Vasanthi, ***Masilamani Elayaraja, ****R Murugesan, *****Yajuvendra Singh Rajpoot, *****Karuppasamy Govindasamy, *****Hemantajit Gogoi

*Pondicherry University (India), **Pondicherry University (India), ***Pondicherry University (India), ****Pondicherry University (India), *****Lakshmbai National Institute of Physical Education (India), *****SRM Institute of Science and Technology (India), *****Rajiv Gandhi University (India)

Abstract. Field hockey requires a diverse skill set that includes strength, speed, anaerobic power, and endurance due to current advancements in sports science, plyometric and strength activities for enhancing player's performance. As a result, field hockey players and coaches are in constant need of new training interventions which could be most effective for improving the required parameters. Therefore, the current study investigates the influence of French contrast training (FCT) on selected biomotor and physiological variables in field hockey players. A total of thirty (N=30) male field hockey players were purposively selected from Union Christian College, Aluva, India. They were randomized into two groups: a treatment group (TG) that underwent twelve weeks of FCT and a control group (CG) that performed their daily usual activities. The selected biomotor outcome parameters were muscular strength (MS) and speed (S), while the physiological parameters were anaerobic power (AP), resting heart rate (RHR), and vital capacity (VC). The pre and post-test mean differences were analysed using paired-sample t-test and the level significance was fixed at 0.05 across all cases. The results revealed that there were significant enhancements in MS ($p<0.01$), S ($p<0.01$), AP ($p<0.01$), and VC ($p<0.01$) in the TG after twelve weeks of FCT, while the CG did not show any significant differences. Exceptionally, RHR did not show any significant difference in both TG and CG. Conclusion: The study suggests that FCT can be an effective method to improve selected biomotor and physiological parameters, except RHR in male college-level hockey players.

Keywords: French contrast training, muscular strength, speed, anaerobic power, resting heart rate, vital capacity.

Resumen. El hockey sobre césped requiere un conjunto diverso de habilidades que incluye fuerza, velocidad, potencia anaeróbica y resistencia debido a los avances actuales en la ciencia del deporte, así como actividades pliométricas y de fuerza para mejorar el rendimiento de los jugadores. Como resultado, los jugadores y entrenadores de hockey sobre césped necesitan constantemente nuevas intervenciones de entrenamiento que puedan ser más efectivas para mejorar los parámetros requeridos. Por lo tanto, el presente estudio investiga la influencia del entrenamiento de contraste francés (ECF) sobre variables biomotoras y fisiológicas seleccionadas en jugadores de hockey sobre césped. Se seleccionaron intencionadamente un total de treinta (N=30) jugadores masculinos de hockey sobre césped de Union Christian College, Aluva, India. Fueron asignados al azar en dos grupos: un grupo de tratamiento (GT) que se sometió a doce semanas de ECF y un grupo de control (GC) que realizó sus actividades diarias habituales. Los parámetros biomotores seleccionados fueron la fuerza muscular (FM) y la velocidad (V), mientras que los parámetros fisiológicos fueron la potencia anaeróbica (PA), la frecuencia cardíaca en reposo (FCR) y la capacidad vital (CV). Las diferencias medias pre y post-test se analizaron mediante la prueba t de muestras emparejadas y el nivel de significancia se fijó en 0,05 en todos los casos. Los resultados revelaron que hubo mejoras significativas en FM ($p<0,01$), V ($p<0,01$), PA ($p<0,01$) y CV ($p<0,01$) en el GT después de doce semanas de ECF, mientras que el GC no mostró diferencias significativas. Excepcionalmente, la FCR no mostró ninguna diferencia significativa tanto en el GT como en el GC. Conclusión: El estudio sugiere que el ECF puede ser un método efectivo para mejorar los parámetros biomotores y fisiológicos seleccionados, excepto la FCR, en jugadores de hockey universitarios de nivel masculino.

Palabras clave: entrenamiento de contraste francés, fuerza muscular, velocidad, potencia anaeróbica, frecuencia cardíaca en reposo, capacidad vital.

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Hemantajit Gogoi
gogoihemantajit@gmail.com

Introduction

Field hockey is a demanding sport that requires a combination of physical and physiological components for elite success. Strength, speed, and skill are crucial aspects that players need to excel in to perform at the highest level in field hockey (Burr et al., 2008; Koca & Revan, 2023). To excel in the game, athletes need to not only improve these abilities but also maintain constant ball control, swiftly change directions,

and seamlessly transition between walking and sprinting during matches. Players are also required to exhibit impeccable defensive strategies when under offensive pressure. Attaining peak performance and sustained well-being necessitates thorough training and continuous guidance. Thus, coaches and professionals are constantly working to introduce innovative and enhanced training methodologies to improve player capabilities and refine individual proficiencies (Indranil et al., 2015, p. 8; Krishnan & Rajawadha, 2020; Sharma & Kailashiya, 2018). To develop the desired characteristics in

players, coaches are adapting the training programs and methodologies according to the specific needs of a sport (Burr et al., 2008). Plyometrics are exercise procedures used by athletes in various kinds of sports to enhance their strength and explosiveness. These methods are effective in eliciting training responses over time (Genç & Dağlıoğlu, 2021; Hasan, 2023; Kons et al., 2023; Rahimi & Behpur, 2005; Senthil Kumar, 2016). Plyometric exercises are often comprised of stretch-shortening cycle exercises, which combine multi-joint motions, quick eccentric phases, and intense contractions. Various sports, including hockey, basketball, track & field, football, and volleyball, that require speed and power have demonstrated the benefits of this style of training (Amrinder et al., 2014). On the other hand, resistance and strength training refers to the same sort of activity and exercise training that attempts to enhance muscle strength, power, and local muscular endurance for both general fitness and competitive sports. This conditioning approach allows users to engage in a variety of training modalities and resistive loads, including body weight and barbells (Stricker et al., 2020). Some of the studies state that adequate resistance training, in addition to sport-specific training, is required to develop physical fitness and athletic performance (Ita & Guntoro, 2018; Ratel, 2010; Tobin, 2014; Zouita et al., 2023). Others agree that incorporating both resistance training and plyometric training into training routines is critical for the development of muscular power (Ali et al., 2017; Ebben & Blackard, 1997).

Among novel and emerging training methods, the French contrast training (FCT) method increases post-activation potentiation (PAP) by increasing the performance of muscles following a muscle activation. This method involves a unique training protocol designed to stimulate muscle contraction through exercises that elicit a potentiation effect on boosting the pace at which force is created and explosive motions are accomplished (Elbadry et al., 2019; Xenofondos, 2010). Muscle contractions in the context of field hockey involve various physiological processes, including nerve impulses that play a crucial role in initiating and coordinating muscle contractions. It combines elements from both the complex and contrast methods (Elbadry et al., 2019; Welch et al., 2019). This method improves the ability of players to generate force quickly and efficiently by targeting both slow-twitch and fast-twitch muscle fibers. On the other hand, Vital capacity (VC), resting heart rate (RHR), and anaerobic power (AP) are important physiological variables to consider when playing field hockey. These variables are directly related to the readiness of the body for the sports-specific demands. The VC is a key physiological function which has a significant impact on performance during motor exertion by supplying the necessary oxygen to the muscles and maintaining the acid-base balance in the blood (Vileep & C, 2017). Whereas, RHR and AP are important in supporting the high-intensity activity of field hockey (Lin et al., 2023). Some studies explored the short-

term effect of FCT on various outcome measures (Alves et al., 2010; Hernández-Preciado et al., 2018). However, there has been limited research linking PAP and the long-term effects of FCT on various outcome measures (Elbadry et al., 2019; Welch et al., 2019, p. 9). Additionally, there was no existing research associating FCT specifically with field hockey players. Consequently, in the current study, researchers intended to explore the impact of the FCT on biomotor and physiological parameters in college-level field hockey players. It was hypothesised that there would be significant improvement in all selected parameters after FCT.

Material and methods

Study participants

A total of thirty (N=30) male field hockey players participated in the study. Inclusion criteria included age between 18 to 24 years, participation in intercollegiate tournaments from Union Christian College, Aluva, India and having at least six years of experience in field hockey and at least six months of experience in designed resistance training (3 sessions/ week). Participants with any type of musculoskeletal injuries were excluded from the study.

The study was approved by the Institutional Ethical Committee at Pondicherry University, India (Clearance No. HEC/PU/2023/05/07-08-2023) and adhered to the declaration of Helsinki (World Medical Association, 2013). The participants were contacted by the researchers during their usual evening practice sessions in the presence of their coach. Before obtaining consent from the participants, detailed information and objectives of the current study were presented verbally and in writing to ensure their understanding. Each participant willingly provided written and verbal informed consent to take part in the research.

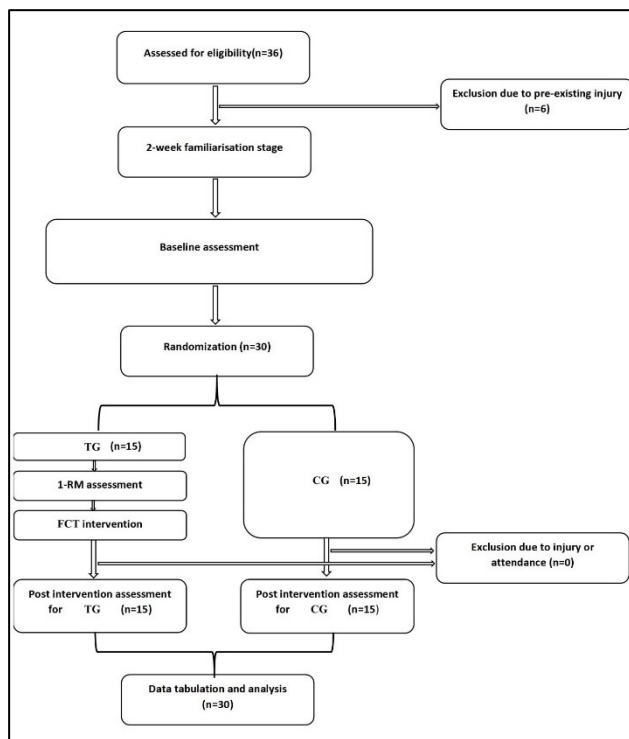


Figure 1. Research design and sampling size in different phases of research

Study and experimental design

We employed pretest-posttest design for the study. Participants were randomly allocated to either a treatment group (TG) or a control group (CG). The study participants were randomly assigned to both groups using a computer-generated random number sequence created in MS Excel following the methodology used by Govindasamy et al. (2024). Further, the TG underwent twelve weeks of consistent FCT intervention with the proper progressive overloading method, which encompassed three training sessions per week where the training load was based on individualization through 1RM (One Repetition Maximum) (Jiménez-Reyes et al., 2017). However, each training session lasted 60 minutes with adequate recovery. Participants in the CG did not undertake any training other than their daily routine activities (Roberts, 2016). Outcome measures of the biomotor variables, i.e.; muscular strength, speed and the physiological variables, i.e.; anaerobic power, resting heart rate, and vital capacity were assessed 24 hours before and 24 hours after the intervention (Naicker, 2014, p. 14; Roberts, 2016). The procedure of data collection was monitored by the author INKV and the FCT intervention was executed by a hired strength and conditioning expert under his supervision. Figure 1 explains the whole research design of the study.

Tools and equipment

To measure the muscular strength (MS) of the participants, the hand grip strength test was used which is a reliable and valid measure of MS (Singh, 2020a). On the other hand,

to measure the speed (S) of the participants, the 50m run test was used (Roberts, 2016). For analyzing anaerobic power (AP), the Magaria Kalamen test was used (Beitia et al., 2022; Hetzler et al., 2010). While resting heart rate (RHR) analysis was done manually by palpating the radial artery (Mishra & Rathore, 2016; Pickering, 2013; Stankute, 2022; Surendra Sharma & Santosh Singh, 2021). A spirometer was also used to assess vital capacity (VC) (Beatty, 2012; Singh, 2020a, 2020b; Vileep & C, 2017).

One Repetition Maximum

Individualized training intensities were determined using the One Repetition Maximum (1RM) test often conducted (Ring-Dimitriou et al., 2009); participants underwent a familiarization session before testing, ensuring correct technique and safety (Grgic et al., 2020). Participants followed a warm-up routine and attempted progressively heavier weights until their maximum one-repetition load was identified (Grgic et al., 2020). Experienced spotters ensured safety. Training loads for the French contrast program were set as a percentage of each participant's 1RM for optimal strength and power gains (Elbadry et al., 2019; Hernández-Preciado et al., 2018, p. 18).

Training program

The FCT method uses four exercises with minimal rest in between to leverage PAP, essentially harnessing the nervous system to achieve better power. The four exercises used in FCT correspond to the points of the force-velocity curve. It starts with heavy resistance exercise, plyometric exercise after low load weighted jumps and at last, assisted plyometrics for the upper as well as lower body as presented in Table 1 (Welch et al., 2019). Participants used to perform proper general and specific warm-ups before performing the specific exercises. Participants were familiarized with the FCT method with the help of videos and lighter-load training sessions before the start of the actual intervention.

Table 1. Protocol for French Contrast Training

Indicator	Exercise	Intensity	Set	Repetition
Week 1-3	Back squat	60-70% 1RM	1-2	6-8
	Countermovement jump		1-2	6-8
	Loaded countermovement jump		1-2	6-8
	Band assisted jump		1-2	6-8
Week 4-6	Back squat	65-75% 1RM	2-3	8-10
	Countermovement jump		2-3	8-10
	Loaded countermovement jump		2-3	8-10
	Band assisted jump		2-3	8-10
Week 7-9	Back squat	70-80% 1RM	2-3	8-10
	Countermovement jump		2-3	8-10
	Loaded countermovement jump		2-3	8-10
	Band assisted jump		2-3	8-10
Week 9-12	Back squat	75-85% 1RM	3-4	8-10
	Countermovement jump		3-4	8-10
	Loaded countermovement jump		3-4	8-10
	Band assisted jump		3-4	8-10

1RM: One Repetition Maximum

Statistical analysis

Initially, the data was tabulated in Microsoft Excel, and later IBM SPSS version 22 was used to do the following statistical analysis. 1: The Shapiro-Wilk test was used to figure out the normality of the test, and the data was found to have a normal distribution. 2: Means and standard deviations were calculated. 3: The paired sample t-test was performed at a 0.05 level of significance to explore the impact of the intervention by comparing baseline testing results to post-test outcomes. 4: Cohen's d was employed to determine the magnitude of the discrepancy. A minor difference is defined as

$d=0.0-0.2$, a medium difference as $d=0.3-0.5$, and a large difference as $d>0.6$ (Kemarat et al., 2022).

Results

Throughout the study, neither participant reported an adverse effect from injury nor did anyone leave the study early without completion. Mean and SD was presented in Table 2 and Figure 2-6 during the pre and post-test for both the TG and CG for the outcome measures of biomotor and physiological variables.

Table 2. Descriptive statistics (Mean and SD)

Indicators	Treatment Group		Control Group	
	Pre-test	Post-test	Pre-test	Post-test
Muscular strength	44.83±3.85	51.13±4.77	44.53±4.22	44.70±4.06
Speed	7.63±.38	6.97±.18	7.32±.33	7.33±.30
Anaerobic power	1075.27±130.80	1531.10±110.32	1073.18±96.30	1099.74±112.71
Resting heart rate	74.27±2.34	73.47±1.92	74.53±3.06	75.47±2.33
Vital capacity	3.81±.274	4.73±.158	3.77±.263	3.81±.252

Table 3. Descriptive statistics (Mean and SD)

Parameters	Groups	df	t-Ratio	p	Cohen's d
Muscular strength	Treatment Group	14	6.63*	0.000*	1.45
	Control Group	14	0.490	0.632	0.04
Speed	Treatment Group	14	5.05*	0.000*	2.21
	Control Group	14	0.372	0.716	0.03
Anaerobic power	Treatment Group	14	17.26	0.000*	3.76
	Control Group	14	1.19	0.253	0.25
Resting heart rate	Treatment Group	14	1.78	0.097	0.37
	Control Group	14	1.97	0.068	0.34
Vital capacity	Treatment Group	14	11.07	0.000*	4.11
	Control Group	14	0.627	0.541	0.15

* $p<0.05$ level

The results presented in Table 3 revealed that the TG improved their MS significantly more than the CG, as evidenced by a high t-ratio (6.63, $p<0.05$) and a significantly high effect size (Cohen's $d=1.45$). This suggests that using FCT had a significant impact on improving muscular strength. The CG, on the other hand, showed no significant changes, with a non-significant t-ratio (0.490, $p=0.632$) and a negligible effect size (Cohen's $d=0.04$). This indicates the effectiveness of the FCT intervention in increasing MS. Similarly, the speed results show a significant difference between the TG and CG. The TG's t-ratio (5.05, $p<0.05$) combined with a significantly high Cohen's d value (2.21) indicates a significant improvement in S following FCT. The CG, on the other hand, showed no significant changes in S (t-ratio=0.372, $p=0.716$, Cohen's $d=0.03$). These findings highlight the effectiveness of FCT in eliciting positive speed adaptations. In the context of anaerobic power, the TG demonstrated a significant improvement and high effect size in AP, as evidenced by the t-ratio

(17.26, $p<0.05$) and Cohen's d (3.76). The CG, on the other hand, showed only minor improvements in AP (t-ratio=1.19, $p=0.253$, Cohen's $d=0.25$). However, RHR analysis revealed no significant difference between the TG and CG (TG: t-ratio=1.78, $p=0.097$, Cohen's $d=0.37$; CG: t-ratio=1.97, $p=0.068$, Cohen's $d=0.34$). Finally, in terms of VC, the TG improved significantly with high effect size (t-ratio=11.07, $p<0.05$, Cohen's $d=4.11$), whereas the CG showed only minor improvements (t-ratio=0.627, $p=0.541$, Cohen's $d=0.15$).

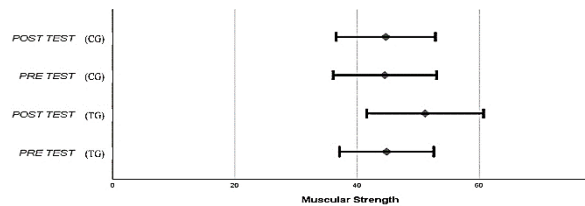


Figure 2. Graphical Representation of Mean and SD of Muscular Strength for TG and CG

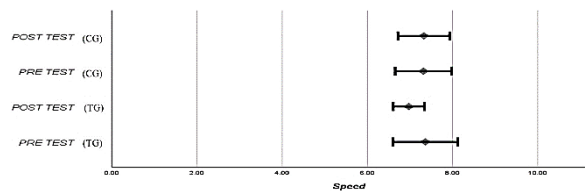


Figure 3. Graphical Representation of Mean and SD of Speed for TG and CG

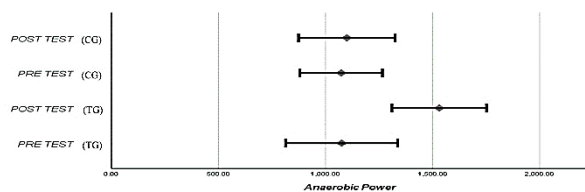


Figure 4. Graphical Representation of Mean and SD of Anaerobic Power for TG and CG

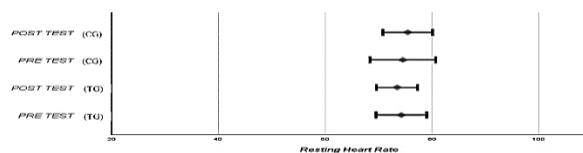


Figure 5. Graphical Representation of Mean and SD of Resting Heart Rate for TG and CG

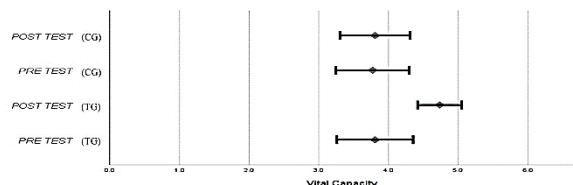


Figure 6. Graphical Representation of Mean and SD of Vital Capacity for TG and CG

Discussion

The results of the present study reveal that French contrast training resulted in significant improvements in muscular strength, speed, anaerobic power, and vital capacity within the treatment group when compared to the control group. Resting heart rate did not show any significant difference in the treatment group as well as the control group. These findings indicate the targeted and versatile benefits of French contrast training, demonstrating its efficacy in improving both general biomotor variables, i.e.; muscular strength and speed and physiological variables, i.e.; anaerobic power and vital capacity.

Resistance training elements in the French contrast training could be the plausible reason for the significant gain in muscular strength noted after twelve weeks of intervention. Resistance training is recognized for its ability to promote muscle hypertrophy (Gould, 2020), which is a major component of increased strength. In French contrast training, the synergistic combination of resistance training and high-intensity exercises probably produced favourable adaptations that promoted both structural changes in muscle tissue and neuromuscular efficiency. The fact that French contrast training emphasizes both neurological and hypertrophic aspects highlights how well it works to produce overall gains in muscular strength (Rathi et al., 2023). Research has shown that the tar-

geted focus of Complex-contrast exercises on specific physical capabilities important for field hockey performance improves muscular strength (Thapa et al., 2023). The exercises directly contribute to the improvement of muscular strength, which is important in field hockey because strong muscles are associated with speed. The variety of French contrast training for both arms and legs, strategically distributed throughout the program periods based on specific goals, engages a significant number of motor units, resulting in robust and rapid muscle contractions and, ultimately, improved explosive performance. Furthermore, the role of muscle spindles in determining elastic force efficiency, which is dependent on the responsiveness of sensory receptors in extensor muscles during activities such as prolonged pushing and hitting in field hockey, has been highlighted by the researcher Thapa et al., 2023. Some of the previous studies are in line with current study results on muscular strength (Ingle et al., 2006; Josef, 2018, p. 6; Labib, 2013). Labib (2013) suggests that a two-month Complex training program can assist female handball players in improving their composite skilful performances, strength, and power. One of the present study results aligns with the previous study by Ingle et al. (2006). Twelve weeks of upper and lower body complex training is a safe, efficient, and time-effective training method that improves dynamic strength significantly in prepubescent and early pubertal boys. One systematic review corroborated the present study by Josef (2018), indicating that complex training appears to be an effective and efficient strategy for enhancing strength, jump, and sprint performance.

Increased recruitment of motor units, firing frequency, intra- and inter-muscular coordination, and morphological and structural alterations that facilitate the production of muscle force are among the specific adaptations that may account for the improvement in speed for the French contrast training intervention group in comparison to the control group (Bosco, 1997). It is possible that participants underwent adaptations that allowed them to generate more force, resulting in increased power production during the prescribed actions. Furthermore, incorporating plyometric exercises in French contrast training may have allowed for more efficient energy transfer between eccentric and concentric muscle actions, resulting in improved coordination and synchronization among active muscle groups. These adaptations may be indicative of improvements in motor skills, particularly in areas such as speed and anaerobic power, which may have contributed to the positive outcomes observed in our study (Cronin et al., 2001). Some of the previous studies align with the current study result of speed (Ali et al., 2018; Ángel et al., 2017; Kanniyan & Syed, 2013, p. 017; Kumar & Jesudass, 2017). Ali et al. (2018) reported that complex training improved vertical jump, speed, and agility in professional male soccer players after six weeks of complex training and contrast training. While Ángel et al. (2017) investigated the effects of a 10-

week contrast training on prepubescent basketball players. The contrast training program increased vertical jump, sprint, and agility, implying that prepubertal children have high muscular strength trainability. Six weeks of complex training improves the speed of hockey players (Kumar & Jesudass, 2017), and ten weeks improves male soccer players (Kanniyar & Syed, 2013).

The training program that includes resistance training, plyometrics, weighted jumps, and assisted movements such as running and jumping significantly improves neuromuscular efficiency. This comprehensive approach not only enhances the stretch reflex but also improves muscle-nervous system coordination. Resistance training and explosive plyometrics work together to engage the neuromuscular system completely, fostering an increased ability to generate force. This refined neuromuscular efficiency, honed by the various components, seamlessly transfers power to activities with similar biomechanical demands, especially those requiring a forceful thrust from the hips and thighs, such as running and hopping. The intricate interplay of resistance training, plyometrics, and assisted movements creates an environment conducive to maximizing muscle contraction efficiency. Given these considerations, the collective effect of French contrast training on neuromuscular efficiency and lower body engagement provides a plausible explanation for the observed increase in anaerobic power. One of the previous studies is supported by the current study result on anaerobic power (Chang et al., 2022). Chang et al. (2022) investigated the effects of eight weeks of high-intensity power training, compared to traditional resistance training on exercise performance. The research demonstrated that both high-intensity power training and traditional resistance training can improve upper and lower-limb explosive force. Notably, high-intensity power training, actually a time-saving method, resulted in a more significant improvement in mean anaerobic power.

Exercise, particularly resistance exercise and short sprints, can help to increase vital capacity. During exercise, the human body's demand for oxygen increases, resulting in increased breathing rates and circulation to supply oxygen to the working muscles. Regular exercise, such as resistance training and short sprints, can strengthen the heart and lungs, making them more efficient at supplying oxygen to the bloodstream and transporting it to the muscles. This improved cardio-respiratory function allows the body to perform exercise more efficiently, resulting in increased vital capacity. Some of the previous studies are supported by the current study result on vital capacity (Das & Saha, 2013; Suryanarayana & Kumar, 2022; Ramesh & Venkatachalapathy, 2022, p. 022). Das and Saha (2013) conducted a study to see how resistance running affected vital capacity in untrained tribal and non-tribal schoolboys. The findings of the research indicated that resistance running emerged as the most effective exercise for

enhancing the vital capacity of the human body. Suryanarayana & Kumar (2022) examine the twelve weeks of Aerobic training, Resistance training, and Concurrent training. All three training sessions enhanced the vital capacity compared to the control group. Ramesh & Venkatachalapathy (2022, p. 022) also exposed those respiratory measures such as vital capacity all enhanced considerably due to the twelve weeks of strength and circuit strength training exercises.

Based on current study findings, resting heart rate had no significant difference in the French contrast training intervention as well as the control group. As shown by their baseline values, field hockey players in the current study already may reach the desired threshold through constant involvement in the field, which may explain the reported lack of effectiveness in improving resting heart rate through French contrast training and the control group. Some of the literature aligns with these findings (Anek, 2015; Rathi et al., 2023). One of the previous studies conducted by Rathi et al. (2023) stated that there was no significant change in resting heart rate after six weeks of complex-descending training, traditional resistance training, and sport-specific training on female team sport athletes.

The study has several strengths, including significant improvements in muscular strength, speed, anaerobic power, and vital capacity in the treatment group compared to the control group, showcasing the effectiveness of French contrast training in enhancing key performance metrics for field hockey players. The comprehensive approach, which includes resistance training, plyometrics, weighted jumps, and assisted movements, enhances neuromuscular efficiency and overall athletic performance. The findings align with previous research, adding credibility and providing practical recommendations for coaches to incorporate French contrast training into their protocols. However, the study has limitations: it did not significantly change resting heart rate and was conducted exclusively on male field hockey players. Further, the controlled conditions may not reflect real-world environments, and the study focused on a limited set of variables. Despite these limitations, the study effectively demonstrates the value of French contrast training in improving athletic performance.

Incorporating French contrast training into the training protocols for male field hockey players is strongly recommended based on the compelling results of the study. It is conceivable for coaches and trainers to structure twelve-week interventions that focus on exercise methods that are targeted at enhancing muscular strength, speed, and anaerobic power. Despite the limitations of the study, monitoring and customizing training programs is imperative to achieve improvements in resting heart rate. It is essential to develop an individualized training plan, to combine French contrast training with skill-specific drills, and to equip the athletes and coaches on the benefits of these methods. As a result,

this practical approach leads to sustained improvements in the performance of field hockey players, which aligns with the demands of the game.

Conclusions

The study found that French contrast training resulted in significant improvements in muscular strength, speed (in biomotor variables), anaerobic power, and vital capacity (in physiological variables) among male field hockey players when compared to a control group. Despite the positive outcomes observed in these areas, it is worth noting that the twelve-week intervention did not result in an improvement in resting heart rate among field hockey players. This study demonstrates the significant potential of French contrast training as an effective developmental tool for field hockey players. French contrast training is recommended for coaches, trainers, and athletes looking to improve their regimens. Such inclusion has the potential to promote the desired changes in biomotor and physiological variables, thereby, significantly improving the performance of field hockey players.

Conflict of interest

The authors assert that no potential conflicts of interest influenced the outcome of this study.

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Datos de los/as autores/as y traductor/a:

Ibnu Noufal K V	noufalibnukv70@gmail.com	Autor/a
G Vasanthi	drvasanthipu@gmail.com	Autor/a
Masilamani Elayaraja	elaya.cricket@gmail.com	Autor/a
R Murugesan	murugesanr.pucc@pondiuni.ac.in	Autor/a
Yajuvendra Singh Rajpoot	yajupitu25@gmail.com	Autor/a
Karuppasamy Govindasamy	gowthamadvog@gmail.com	Autor/a
Hemantajit Gogoi	gogoihemantajit@gmail.com	Autor/a
Poli Borah	poliborahsprinter@gmail.com	Traductor/a