

Comparing and analyzing elite soft tennis players: Match workload, technique, and action area in high-level competitive games

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ABSTRACT

Analysing data from high-level matches soft tennis from elite players is something that coaches and athletes can use to improve their training and competition. The study aimed to compare the match workload action areas and analyse techniques between male and female soft tennis players in high-level competitions from soft tennis in 10 final matches. Data analysis of match workload, techniques, and action areas occur in matches performed using the Dartfish software. The data is analysed statistically, compared between males and females for match workload, and presented as percentages for each technique and action area. The results of the analysis showed that Rally time shots, Rally total time Work Density, and Percentage rally during the match of male players were significantly higher than those of female players, $p \leq .05$. The Flat technique was used more at the competition (Male; Forehand 38.77% Backhand 39.19% and Female player, Forehand and Backhand are equal at 36.91%) with the correlation between both techniques being $r = .0974$. Slice and Lob techniques 3.00-10.08%, and Volley and Smash techniques used the least during matches. The playing area of all players will be at the Mid left, up to 31.99-41.10%. Fore right is the area with the least play, 1.97-3.21%. Data from the study shows that male players have a higher match workload than women. However, there are no differences in the use of techniques in the competition, including the playing action area. This result will help coaches and players practice and develop their abilities at a higher level.

Keywords: Performance analysis, Racket sport, Workload analysis, Action area, Technical analysis, Match analysis.

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INTRODUCTION

Soft tennis is a racquet sport that combines technical skills in competition and physical fitness. It involves intermittent high-intensity levels and short rest periods (Martínez, 2014; Mellado-Arbelo & Baiget, 2022). Coordination mainly involves working between the wrists, arms, and torso to create power and accuracy in shots. Therefore, players must have good hand-eye coordination to display their playing skills and techniques (Cui et al., 2017; Paul et al., 2011). Players must have quick feet and agility to move around the field and reach the ball quickly. Footwork involves taking short steps and quick changes in direction to predict the opponent's shot and position for the next shot. Just as one of the critical physiological characteristics of soft tennis is cardiovascular endurance, soft tennis matches can be long and physically demanding, requiring players to have a high level of physical fitness. High levels of aerobic and anaerobic exercise combined (Kilit et al., 2016; Kovacs, 2007; Lees, 2003) and an athlete's stamina can help increase the muscle power needed to create powerful shots in the field. Soft tennis Players must, therefore, focus on improving their cardiovascular fitness, including strength and muscle power (O'Donoghue et al., 2013). Athletes, therefore, need to develop specific technical and fitness skills simultaneously.

Long and intense competitions cause increased fatigue in the physical (Gomes et al., 2011). Therefore, physical readiness and skills used in competitions must be well-trained. Because the outcome of the competition depends on the decision to hit each point (Kolman et al., 2018), using technology to record data and analyse data from competitions to provide coaches and athletes with a clearer image (Hiroo et al., 2023). Competition data can also be used to plan training, such as intensity, volume, and amount of use. Technique and the speed used in competition can be used to improve and design the players' training programs, leading to training close to real competition (Carvalho et al., 2013; Filipcic et al., 2022). However, the intensity of the competition varies with the players' skill levels (Mellado-Arbelo & Baiget, 2022). At the top level of competition, experienced players at a high level tend to adapt well to training programs and the intensity of competition. As the length of the competition increases, they can better control the situation and pressure of the competition and maintain their physical fitness better than those with less experience (Kovalchik & Ingram, 2018), giving them a greater chance of winning due to their physicality. Technical and tactical skills are superior to the opponent's (Gomes et al., 2011; Kovalchik & Ingram, 2018). Adequate and appropriate training using data is therefore necessary. Allow athletes to develop their physical abilities and skills to the highest level (Kolman et al., 2023; Torres-Luque et al., 2011).

Therefore, it is necessary to use data obtained from the analysis of high-level games for training or competition, considering of the duration of the competition. Rally time ratio of work and rest Intensity of the game Techniques and skills used in competitions (Carboch et al., 2018; Carboch et al., 2019; Martínez-Gallego et al., 2021). Based on video recordings. Today's data analysis programs and technologies provide visibility into critical competitive data (Hiroo et al., 2023), expressed in simple percentages or numbers that are easier for coaches or athletes to understand (Fitzpatrick et al., 2019) and can develop skills, techniques, and physical fitness to be more suitable for soft tennis. This study is therefore interested in analysing and comparing the differences in workload between male and female soft tennis players, as well as the proportion of use of skills, techniques, and playing areas of soft tennis players and leading in order to lead to further development of the trainer's training program.

METHODS

Participants and Measures data

This study is a quantitative data analysis of the competition of top soft tennis athletes from three event finals round (World Championships, Asian Championships, and Asian Games) from 2016-2022 by selecting from match with more than 50 points from competing in the men (5 match) and women (5 match), totalling ten matches. Before the analysis, the researcher checked the scores of each match to ensure that the data to be analysed totalled more than 50 points in each match. The data analysis will divide into three topics these include workload, techniques and skills and action areas. Experts with experience as five coaches and sports scientists of more than 6 ± 2.0 years determined variable analysis. The computer software Dartfish Live S v.10 will analyse the data for all competitions. This research received an exemption from human research ethics from the Human Research Ethics Committee Sirindhorn College of Public Health, Yala.

Procedures

Video analysis was recorded by a Sony Handycam (HDR PJ670) video resolution: AVCHD 1920 x 1080/60p) with a tripod. The video camera will be placed behind the players on either side and 8-10 meters from the field. The camera angle is such that the players and the entire field on both sides can be seen. (Figure 1).

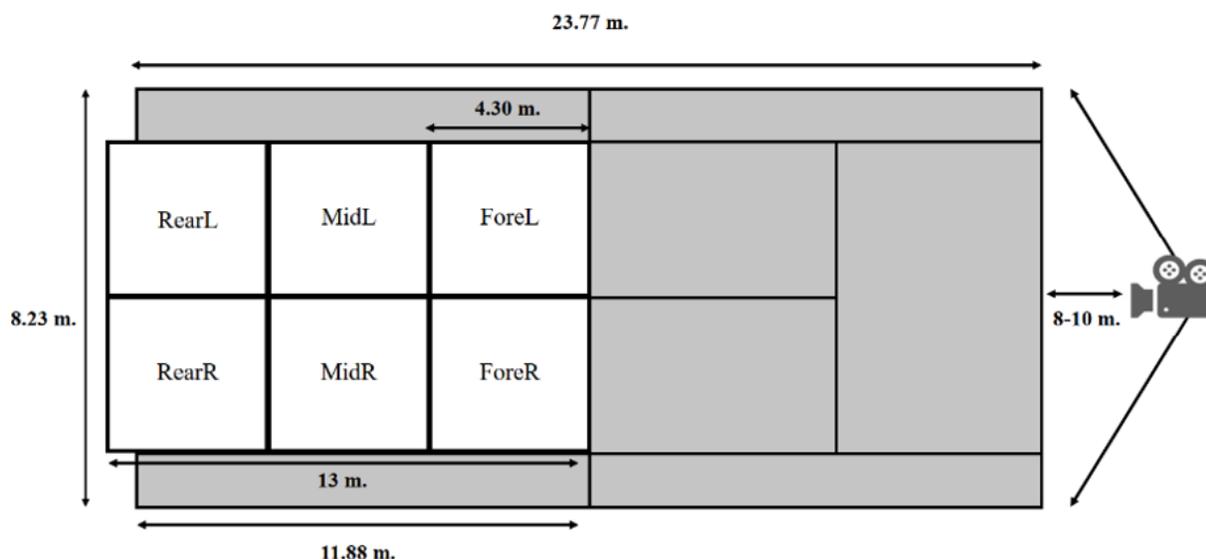


Figure 1. Location of video cameras and analysis of areas within the court.

Data analysis uses the computer program Dartfish Live S v.10 to analyse and compile data from video recordings of selected matches. It records the first data Match workload, including Rally Time (RLT), Time of rally for each score, Rest Time (RT), rest time for each score, Total Time (TT); total time of match, Shots Rally (SRL); number of shot per one score, Work Density (WD); ratio between RLT/RT, Percentage Rally during Match (%RLM); Percentage of total rally time, Percentage Rest during Match (%RM); percentage of total rest time and percentage of time wasting (%TW).

The second data: Technique during match include Forehand Flat (FHFlat), Backhand Flat (BHFlat), Forehand Slice (FHSlice), Backhand Slice (BHSlice), Forehand Lob (FHLOB), Backhand Lob (BHLOB), Forehand Volley (FHVL), Backhand Volley (BHVL), Forehand Smash (FHSM), and Backhand Smash (BHSM). The third data: Action area includes Fore Left (ForeL), Fore Right (ForeR), Mid Left (MidL), Mid Right (MidR), Rear Left

(RearL), and Rear Right (RearR) (Figure 1). During data analysis, the researcher will have control over the analysis program. All match analysis data will be re-analysed to prevent errors and will not be edited later by researchers to avoid opinions or beliefs about the data.

Statistical analysis

Statistical analysis was performed by SPSS version 26 (IBM, Chicago, Illinois, United States of America) used the independent sample T-Test to compare the match workload between the ten men's and women's matches. The correlation of technique during matches was determined using statistics Pearson correlation. It shows the mean and standard deviation of the data, including presenting the percentage of the item. Statistical significance was set at the $p \leq .05$.

RESULTS

From the results of the independent sample T-Test statistical in the match load analysis found that RLT, SRL, TT, WD, and %RLM of males had a significantly higher average than females, $p < .05$ However, no difference in RT and %RT and %TW (Table 1).

Table 1 Compare the match load data between the men vs women competitions.

Parameter	Workload		p
	Female \pm SD	Male \pm SD	
Rally Time (sec)	7.78 \pm 2.66	18.38 \pm 6.78	0.012*
Rest Time (sec)	29.7 \pm 4.95	32.02 \pm 3.02	0.397
Shot Rally (N)	4.87 \pm 1.70	12.58 \pm 4.64	0.008*
Total Time (min)	22.46 \pm 8.40	42.84 \pm 13.63	0.022*
Work Density	0.26 \pm 0.09	0.58 \pm 0.22	0.019*
Percentage Rally during Match (%)	19.70 \pm 2.78	32.81 \pm 7.84	0.005*
Percentage Rest during Match (%)	73.59 \pm 12.95	57.91 \pm 9.18	0.058*
Percentage of time wasting (%)	7.27 \pm 11.24	9.27 \pm 5.09	7.260

Note. * $p \leq .05$.

The FHFlat and BHFlat techniques were used the most in the competition (Men; FHFlat 38.77%, BHFlat 39.19% and Women; FHFlat 36.91%, BHFlat 36.91%), with the techniques having Pearson correlation high level $r = .974$ statistically significant $p > .05$, followed by FHSlice and BHSlice (Men; BHSlice 8.32% FHSlice 5.78% and Women; FHSlice 10.08% BHSlice 7.20%) with a Pearson correlation moderate level $r = .710$, which is statistically significant at the .05. Other techniques, FHLOB and BHLOB technique women slightly higher than men (Women BHLOB 7.33% and FHLOB 6.68%, Men; BHLOB 3.23% FHLOB 3.00%), with FHVL, BHVL FHSM and BHSM being the techniques that Used least (Men; FHVL 0.49% BHVL 0.42% FHSM 0.68% BHSM 0.11% and Women; FHVL 0.92% BHVL 0.52% FHSM 0.39% BHSM 0.13%, respectively).

Action area found that MidL is the area used for playing the most (men 41.10%, women 31.99%), followed by RearL (men 23.44%, women 19.63%), MidR (men 17.09%, women 21.94%) RearR (men 11.02% women 17.32%) ForeL (men 5.38% women 6.00%) and the least was ForeR (men 1.97% women 3.12%), respectively.

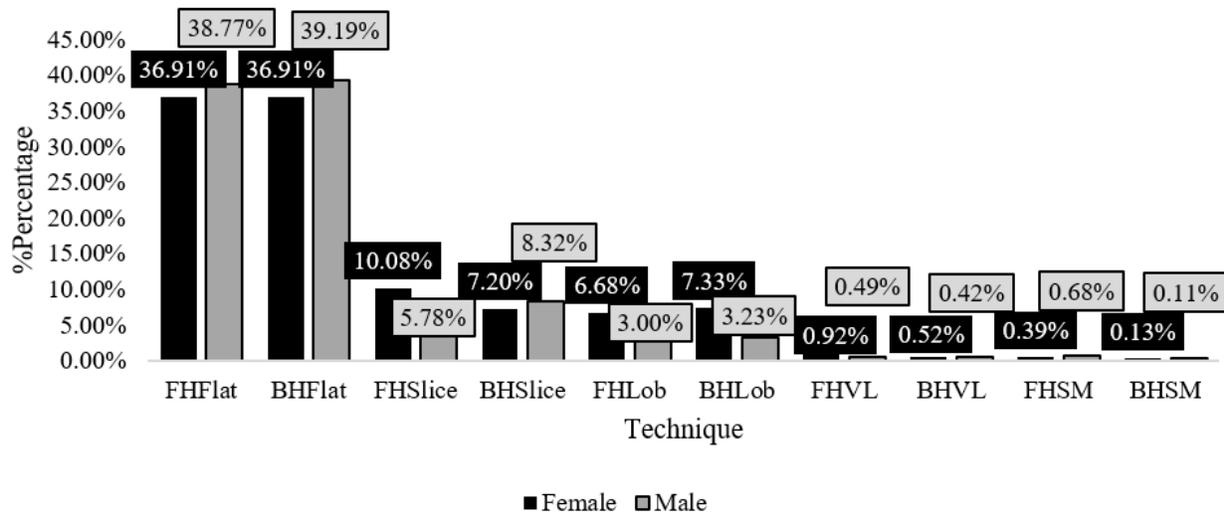


Figure 2. Percentage of techniques used during match by men and women players.

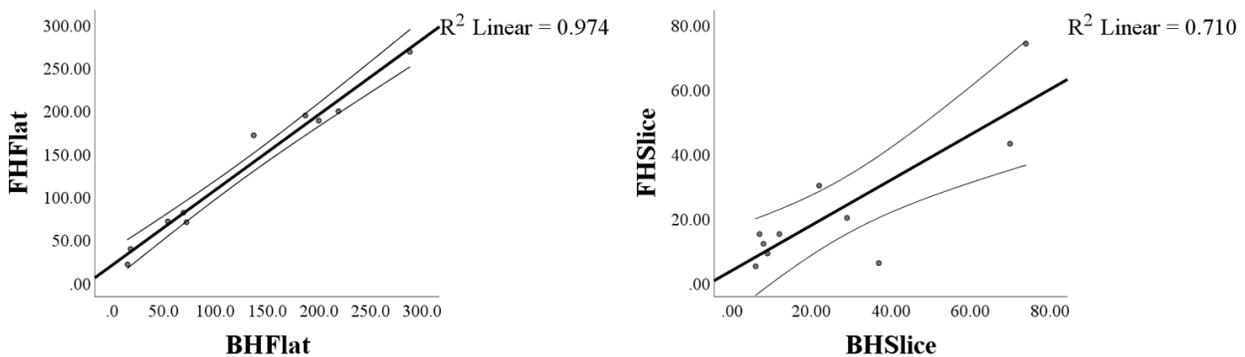


Figure 3. Pearson Correlation techniques used by all players during matches.

DISCUSSION

The match workload of competition between men and women players is different, especially the duration of the rally, which is very different. It shows that during the competition, male players will spend more extended time shooting the ball than female players, resulting in the number of shot rallies being higher and different. The duration of the competition is also different, consistent with the fact that the work density of male players is higher than that of female players. However, there is no difference in the length of time between points, the percentage of time between points in a game, and the dead time between games. These data show that match workload has a relatively high physiological response (Martin & Prioux, 2011).

Specifically, male players have a significantly higher and more intense match workload than female players and a similar proportion of short rest periods (Martinez, 2014). The intensity of such competition affects the performance of athletes during the competition (Martin et al., 2016). Players with more tactical experience have better physical performance, such as muscle power (Aoki et al., 2018); alternatively, an excellent aerobic system helps them physically perform at a lower level (Baiget et al., 2015) and deal with fatigue better (Gomes et al., 2011). These will give players an advantage over their opponents when faced with situations

that require high pressure, decision-making, or predictability during matches, which will be better than players with less experience and skill level, which are variables that result in different results (Kolman et al., 2018; Kovalchik & Ingram, 2018). Therefore, coaches must have strategies to help players gain an advantage in intense competition. Different for both male and female players.



Figure 3. The graphic shows the percentage of action area of men and women players.

Most of the techniques used in the competition use the forehand flat and backhand flat as the primary techniques during competitive. Both techniques have a high level of relationship; players will choose techniques to gain an advantage or survive, mainly during returns serve, which is the period that influences the timing of the opponent's counterattack (Gillet et al., 2009), including rally shots. In rally shots that last for a long time, players often use forehand flat and backhand flat techniques to maintain the rhythm of the counterattack continuously. It is also a technique that can control and provide maximum power in hitting (Bollettieri, 2015; Muhamad et al., 2011), making flat-hitting techniques more common in high-level competitive games. Similar to using slice techniques in playing in the service area. The area of the court in which the forehand slice and backhand slice are techniques with a moderate relationship, where the percentage of use of the slice technique is close to the lob technique. However, there is no relationship between the forehand and backhand lob technique. The technique is primarily flat, not complicated, and can create more rhythm than other techniques. Experienced and skilled players will make decisions about their advanced technique (Kolman et al., 2018), the complexity of technique (Kolman et al., 2023), and the speed of serving or hitting the ball with precision is related to the level of the player (Ulbricht et al., 2016).

In the action area in soft tennis in high-level competition, more than 40% of male and female players tend to play in the mid-left area, where the most counterattacking occurs. They are counterattacking in the mid-left area of the player because most players tend to use their right hand to play, resulting in the use of the backhand technique in counterattacking in that area where the backhand is a skill that provides accuracy and a high percentage of hits (Muhamad et al., 2011), making it used by most players for rally shots, as well as the rear left area of the court as an area for counterattacking. Next up, other areas tend to have very little play and may be used for hitting shots to turn into critical points, such as hitting in the fore right area, which has the most minor percentage of play and is where most of the hitting techniques are used forehand, which can provide maximum power for hitting (Bollettieri, 2015).

The importance of using match workload, technical information in high-level competitions, and action area calculations and percentage comparisons can make interpretation more accessible for coaches (Fitzpatrick et al., 2019). The top players in the finals have similar match workloads, but there are differences in the intensity and duration of the rally between the male and female players. The techniques are similar in terms of percentages used during matches, and the percentages of playing space are not significantly different. Whether athletes play the same or different games may have different results. Athletes' competitive abilities or playing methods that differ from current competition may produce different results, which future studies may determine. Trainers should use this information to design physical fitness training programs, techniques, and strategies most appropriate for competition. To increase the players' performance, which will vary with the standard of play. (Mellado-Arbelo & Baiget, 2022). In addition, well-educated data coaches and athletes with proper training can help players have increased positive mental outcomes (Meffert et al., 2021) and can create an impact. Aggressiveness in competition is part of the method that will lead to success in competition (Paserman, 2023).

CONCLUSIONS

The data shows that male players have a significantly higher match load than female players, with no difference in the rest time lost between matches. The intensity of male matches is, therefore, higher. Both had similar percentages of techniques used during the competition, and the main techniques used were also moderately to highly related, indicating that the technical aspects of the competition were very similar. Moreover, the percentage of playing areas during most matches was similar, which may indicate the tactics used by the elite athletes in the finals. This information will help develop physical fitness training methods, techniques, and tactics for high-level competitiveness.

AUTHOR CONTRIBUTIONS

Nathapol Thongthanapat is responsible for conceptualization, research methodology and data collection. Watunyou Khamros is responsible for data analysis, review literature and writing manuscript. Both authors approved the final version for published together.

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DISCLOSURE STATEMENT

No potential conflict of interest were reported by the authors.

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