

## Relative Age of Elite Clay Tennis Players: Cross-Sectional Study

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### Original Article

#### Abstract

**Introduction:** Relative age affects the development of sports talents. Early puberty gives athletes an advantage, making coaches prefer mature athletes. This study analyzed the relative age distribution among elite clay tennis players in Iran.

**Materials and Methods:** This study analyzed the relative age of 430 tennis players between the ages of 10 and 19 (228 girls and 202 boys) who participated in 1400 national ranking tournaments in clay tennis. The study analyzed the participants' relative age based on their birth month. The first quarter of the Gregorian calendar (January 1<sup>st</sup> to March 31<sup>st</sup>) was referred to as Q1, the second quarter (April 1<sup>st</sup> to June 30<sup>th</sup>) was Q2, the third quarter (July 1<sup>st</sup> to September 30<sup>th</sup>) was Q3, and the fourth quarter (October 1<sup>st</sup> to December 31<sup>st</sup>) was Q4. The first quarter of the Persian calendar (Pc) (Farvardin 1<sup>st</sup> to Khordad 31<sup>st</sup>) was referred to as Q1Pc, the second quarter (Tir 1<sup>st</sup> to Shahrivar 31<sup>st</sup>) was Q2Pc, the third quarter (Mehr 1<sup>st</sup> to Azar 31<sup>st</sup>) was Q3Pc, and the last three months (Dey 1<sup>st</sup> to Esfand 29<sup>th</sup> or 30<sup>th</sup>) were Q4Pc. A frequency analysis based on birth month and quarter was conducted, and the relationship between relative age and attendance in national ranking tournaments was assessed using the chi-square fit test.

**Results:** Statistical analysis of 430 individuals showed no significant difference in the number of athletes born in the first to fourth trimesters of both Persian and Gregorian calendars. The P-values were 0.148 and 0.258 for Persian and Gregorian calendars, respectively, while the overall P-value was 0.35.

**Conclusion:** It seems that relative age did not influence the selection of clay tennis elite athletes in Iran. However, based on the findings from available studies, it is suggested that researchers, coaches, and training experts consider the interaction among background factors, including the potential effects of relative age, to facilitate raising sports talents.

**Keywords:** Environmental factors; Talent; Development; Relative age; Clay tennis

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#### Introduction

Relative age refers to the difference in age between individuals born in the same calendar year (1, 2). This phenomenon is observed globally in sports and affects mostly the sports where physical abilities are essential (3-5). During puberty, relative age can significantly impact an individual's physical and functional skills (6), making it one of the most important factors limiting individual promotion in sports. Athletes are grouped primarily by their birth year, which can result in a difference in age between players of the same level, ranging from one day to

twelve months. For example, in European football, players born between January 1<sup>st</sup> and December 31<sup>st</sup>, 2005, will all compete in the same age group. The relative age effect (RAE) is the competitive advantage that older individuals have over their relatively younger counterparts in sports and other fields due to differences in physical, mental, and social maturity and more sports experience (7, 8).

Research in various fields, including education (9) and sports (10), has demonstrated that grouping individuals according to their relative age can significantly impact how learners and athletes adapt

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to their environment. This practice may benefit some while harming others. In recent years, numerous studies have examined the impact of birth dates on athletic performance (11-15). These studies have consistently shown that the number of athletes born in the first and second quarters of the year is significantly higher than those born in the third and fourth quarters (16-18). This trend has been observed in both individual sports (9) and team sports (19) and is more pronounced at higher levels of competition (professional versus non-professional) (20). The asymmetry in performance is particularly evident in sports where increased body size and strength positively correlate with performance, such as ice hockey and soccer (21).

In competitive fields, the impact of relative age is more significant than in recreational fields (10). For instance, RAEs are negligible in recreational ice hockey, whereas at competitive levels, they are evident (22). In a research by Wattie et al. (10), the policies determining the participation structure of numerous youth sports systems were studied. One such approach is to use a selection date (e.g., December 31<sup>st</sup>) that generates varying relative ages (including January 1<sup>st</sup> to December 31<sup>st</sup>). Individuals born early in the selection year (e.g., January) are older than those born later in the year (e.g., December). Research in this field has shown that several significant developmental effects are associated with relative age differences (10). It seems that "RAEs" are not present in shooting sports, possibly because physical abilities have less impact on performance in shooting sports.

RAEs are often observed in sports with weight categories, where weight values may account for differences in maturity and physical ability between athletes (23). In a study on "the impact of place and date of birth on young ice hockey players", the date of birth was analyzed to identify the relative impact of age and hometown as determinants of expertise in an international sample of ice hockey players. The findings indicated that in four countries, the RAE is linked to youth participation (24). Interestingly, several recent studies have revealed that athletes born later in the year tend to have higher ratings and wages than those born earlier in the year (25-27), which is also referred to as the "reversal of relative age effect" (RAE reversal). When examining the effect of relative age on women's artistic gymnastics, it seems that delayed maturation is a potential attribute of highly skilled gymnasts. In gymnastics, being bigger is not always better and can be disadvantageous in certain circumstances, while relatively younger

gymnasts, usually smaller, may have an advantage (28). However, some studies have been conducted on the relative age of sports elites (29-31). Since the growth and maturity patterns differ across societies, the RAE can vary from one country to another. Additionally, the RAE can differ depending on differences between sports and within sports, which causes changes in work demands depending on the athlete's role (28). For instance, in elite rugby players, most back players were born in the first quarter of the year, while most forwards were born in the last quarter (32).

Less research has been conducted on the impact of relative age on racket sports compared to other sports. The body management skills have three sub-branches: equilibrium, locomotor, and object control skills. One of the components of these movements is manipulation, which is crucial in racket sports (33). In Iran, football is more popular than other sports, which provides more opportunities to practice fundamental skills like kicking, which are essential in football (34). Unlike many other sports, tennis has no time limit in competitions. This can result in matches lasting anywhere from one hour to five hours, depending on the number of sets played (33). As the tennis field differs from other sports studied previously, there is no research on how relative age affects sports performance in Iran, especially tennis. This study aims to describe the relative age of elite tennis players. Tennis is not as popular as other sports like football, basketball, and table tennis in Iran, and information gathered from this study will be helpful for sports planners.

## Materials and Methods

This research aims to provide descriptive information about tennis players aged 10-19 years who compete in national tournaments. The survey was conducted to collect data from 430 players (228 girls and 202 boys) whose information was collected from the Tennis Federation of the Islamic Republic of Iran's website (<https://iritf.ir>). The research procedures were approved by the Ethics Committee of the Islamic Azad University, Isfahan (Khorasgan) Branch, Isfahan, Iran, before sampling.

All the participants were divided into four quarters based on their birth months. Those born from January 1<sup>st</sup> to March 31<sup>st</sup> were placed in the first quarter (Q1), those born from April 1<sup>st</sup> to June 31<sup>st</sup> in the second quarter (Q2), those born from July 1<sup>st</sup> to September 31<sup>st</sup> in the third quarter (Q3), and those born from October 1<sup>st</sup> to December 31<sup>st</sup> in the fourth quarter (Q4). Similarly, those born from March 21<sup>st</sup> to June

21<sup>st</sup> in the Persian calendar (Pc) that is from Farvardin 1<sup>st</sup> to Khordad 31<sup>st</sup> were placed in the first quarter (Q1Pc), those born from June 22<sup>nd</sup> to September 22<sup>nd</sup> (that is Tir 1<sup>st</sup> to Shahrivar 31<sup>st</sup>) in the second quarter (Q2Pc), those born from September 23<sup>rd</sup> to December 21<sup>st</sup> (that is Mehr 1<sup>st</sup> to Azar 31<sup>st</sup>) in the third quarter (Q3Pc), and those born from December 22<sup>nd</sup> to March 19<sup>th</sup> or 20<sup>th</sup> (that is Dey 1<sup>st</sup> to Esfand 29<sup>th</sup> or 30<sup>th</sup>) in the fourth quarter (Q4Pc).

An ethical approach was taken in conducting the study, and the relative age of the participants was analyzed. Data from 430 participants were categorized to investigate the effect of relative age. The data were then entered into IBM SPSS Statistics for Windows (version 22.0, IBM Corporation, Armonk, NY, USA). Frequency analysis was performed based on birth month and birth quarter to confirm the effect of relative age. The relationship between relative age and the presence or absence of an athlete in the national clay tennis ranking tournaments was examined using the chi-square goodness-of-fit test.

### Results

The study found that the highest frequency of births in the Gregorian calendar was in the first quarter (28.4%), and the lowest was in the fourth quarter (21.6%). In the Persian calendar, the highest frequency of births was in the first trimester (26.74%), while the lowest was in the third trimester (21.4%). More than half of the participants (227, 52.79%) were born in the first half of the Gregorian year ( $P = 0.247$ ), and 230 (53.49%) were born in the first half of the Persian year ( $P = 0.148$ ). The chi-square test showed no significant difference in the proportion of players born in the first to fourth quarters of the Gregorian year ( $P = 0.258$ ) or the Persian year ( $P = 0.35$ ), as shown in table 1.

### Discussion

This study investigated whether the age of elite tennis players and the number of tennis players participating in national ranking competitions were affected by their relative age. The study showed no significant difference in the number of tennis players born in the first four quarters of the Gregorian and Persian years. This finding differed from previous studies (18, 35-38) on the impact of relative age on athletes. So far, researchers have studied the effect of relative age on sports such as hockey, basketball, and football (24, 39, 40). These studies have shown that players born in the first and second quarters of the year (Q1 and Q2) are often seen as superior to their peers

because of their physical and mental attributes. They are often selected over younger athletes born in the same year. In sports where biological factors are crucial for success, relative age based on the "maturation-selection hypothesis" can give an advantage to people born in the first months of the year. This is because relatively older players are naturally heavier, taller, stronger, and faster than others and can benefit from being born earlier in the same year, reaching puberty earlier, and having access to better opportunities.

**Table 1.** Frequency distribution of the number of tennis players based on time of birth

Variable	n (%)	P (Gregorian)	P (Persian)
National ranking		0.258	0.350
High	196 (45.6)		
Low	234 (54.4)		
Gender			
Female	202 (47.0)		
Male	228 (53.0)		
Sport history (year)			
1-5	225 (52.3)		
5-10	133 (30.9)		
More than 10	72 (16.7)		
Birth date			
Gregorian calendar			
First quarter	122 (28.37)		
Second quarter	105 (24.42)		
Third quarter	110 (25.58)		
Fourth quarter	93 (21.63)		
First half	227 (52.79)		
Second half	203 (47.21)		
Total	430 (100)		
Persian calendar			
First quarter	115 (26.74)		
Second quarter	115 (26.74)		
Third quarter	92 (21.40)		
Fourth quarter	108 (25.12)		
First half	230 (53.49)	0.247	0.148
Second half	200 (46.51)		
Total	430 (100)		

The state of advanced maturation in players born in the second half of the year may explain why the influence of birth time is not significant (41). It is possible that the youngest selected players born in the second half of the year offset the effects of chronological age by matching the level of physical growth and maturity with those born in the first half of the year (42, 43). Therefore, when athletes are classified based on chronological age, the biological maturity factor plays a crucial role (41). Although

players born in the second half of the year are less commonly seen in most sports fields, their maturity can enhance their future development and success in sports careers (41, 43). During the early stages of selecting athletic talent, immature players are usually excluded, and mature players are preferred. Coaches generally prefer athletes with a more advanced developmental status (44). However, the impact of relative age decreases in age groups above 15 years due to passing through puberty. An age difference of up to one year has little effect on an adult's physical performance. Nevertheless, children and adolescents may undergo many changes due to rapid growth and development (26).

It is important to note that the developmental status of players may have significantly influenced the initial selection process in the study examined. As athletes advance and factors such as training opportunities, encouragement, education, and the environment come into play, the effect of relative age becomes less significant in later stages. This may explain the differences found in the results of this research. Additionally, it should be noted that the type of sport examined in this study differed significantly from previous studies (24, 39, 40). Clay tennis is not as popular in Iran as football.

On the one hand, the football field receives more applicants than the tennis field due to its affordability and superior facilities. However, when selecting players for high-level teams, intense competition can make maturity and relative age less critical. The clay tennis court in Iran attracts a particular demographic group, especially those with higher incomes, due to the need for personal facilities. Additionally, the number of people participating in this sport is relatively low, which may explain why the effect of relative age is not as apparent in player selection. These differences in player selection may be due to Iran's unique cultural context and that tennis is not as popular as other sports in the country.

The study has shown that the relationship between relative age and athlete success is not straightforward. It is a complex and multifaceted phenomenon. The generation of athletes can significantly impact their physical abilities, affecting their performance. Researchers, professionals, policymakers, program managers, coaches, and sports psychology consultants must understand the interplay between relative age and athlete success. This understanding can help them design sports systems and practical approaches to develop talent. Although talent development is complicated due to multidimensionality of

performance, we must continue discovering and integrating new variables in performance analysis to create the most favorable environment for talent development.

### Limitations

One of the limitations of the current research was the difficulty in completing the sample size. This was due to the lack of access to information on the date of birth of athletes who competed in various tennis tournaments in the past years. A better understanding of the impact of relative age on the selection of athletes can be achieved if the sample size increases and includes data from different years.

### Recommendations

It would be beneficial to conduct further research on how relative age impacts the likelihood of winning medals and participating in national sports teams across various age groups and sports. Additionally, studying the relationship between relative age and cognitive and psychological indicators during puberty can aid in identifying talent and predicting the inclination of teenagers to participate in individual or team sports.

### Conclusion

The study found no significant difference in the number of tennis players born in the first four months of the solar and Gregorian calendars. This means that the athletes' relative age did not influence their selection for the sport. Hence, researchers, coaches, policymakers, program managers, sports psychology consultants, and professionals must consider intra-sport and inter-sport variations to gain better insights into the effects of relative age. The interaction between contextual factors and understanding athletes' differences can help improve coaches' decision-making and increase athlete retention.

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### Authors' Contribution

Study design and ideation: Rokhsareh Badami, Shayan Yazdanparast  
Getting financial resources for the study: Shayan Yazdanparast

Scientific and executive support of the study: Rokhsareh Badami, Shayan Yazdanparast, Zohreh Meshkati

Data collection: Shayan Yazdanparast

Analysis and interpretation of the results: Rokhsareh Badami, Shayan Yazdanparast

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Maintaining the integrity of the study process from the beginning to the publication, and responding to

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### Conflict of Interest

The authors did not have a conflict of interest.

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