AGGRESSION IN WOMEN'S RUGBY: CORRELATION WITH AEROBIC AND ANAEROBIC EXERCISE CAPACITY

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Abstract. *In the game of rugby, aggression is allowed by regulation, being educated the athlete's ability to play and fight until the end without using the destructive act in order to reach the desired performance. In the present research, the group of participants consisted of 20 senior rugby players, professional athletes of the CS Politehnica Iași Women's Rugby Sevens team (163.2 ± 5.9 cm, 59.7 ± 5.8 kg, 22.4 ± 1.6 kg/m2, 28.5 ± 3.1% body fat and 31.1 ± 1.5% muscle mass). The aim of this paper is to investigate the correlations between aggression and the aerobic and anaerobic exercise capacity of female rugby players. The Aggression Questionnaire (AQ) was applied to assess aggressiveness, aerobic capacity was assessed by the VAM-Eval test (49.65 ± 3.99 ml/kg/min), and the 8 x 10 + 10 m test (6.91 ± 1.89%) was used to determine anaerobic lactacid power. Statistical analysis was performed using the GraphPad Prism 6 program by applying the Pearson correlation index. Analysis of the results for the research sample reveal a single significant correlation between maximum oxygen consumption and the level of verbal aggression (r = 0.451, p = 0.045). At the same time, there is no connection between anaerobic exercise capacity and aggression parameters. The research results also indicate a direct relation established between aerobic endurance and the level of verbal aggression of female athletes, which can be used in sports selection.*

Keywords: *rugby, exercise capacity, aggression, monitoring, performance.*

Introduction

The game of rugby involves direct physical confrontation, which requires good control of emotions and prohibits any form of violence (Sarthou, 2010).

In rugby, aggression is allowed by regulation, being educated the athlete's ability to play and fight until the end without using the destructive act in order to reach the desired performance (Chihaia & Pop, 2014).

The game of rugby sevens is characterised by higher intensity compared to the game of rugby 15s (Higham et al., 2012; Higham et al., 2013), which has many moments of acceleration that contribute to the accumulation of fatigue (Carreras et al., 2013). Players are characterised by superior physical abilities, including speed, anaerobic power and aerobic capacity; at the same time, body composition with lower fat percentages can influence the increase in speed and anaerobic power (Higham et al., 2012; Higham et al., 2013).

Thus, rugby players use their aggressive energy only within the limits of the regulation, without reaching an intensity level able to destroy the opponent's integrity. Even if rugby is a sports game based on aggression and combative spirit, the relationship between players and referees is always based on respect (Chihaia & Pop, 2014).

Due to aggression and solidarity, rugby players learn to push their limits, to master their bodies and strength (Villemus, 2007). Intentional acts of physical aggression are part of the

competitive spirit of the game of rugby. In sports, players' high performance was positively correlated with anger and aggression (Visek et al., 2010).

Some authors consider that mental and psychological training represents success in sports performance (Van Rooyen, 2015), psychological factors being decisive in sports careers (MacNamara et al., 2010b). Thus, the psychological skills of athletes will determine sports success (Hendricks, 2012), and competitiveness, commitment and self-confidence will contribute to achieving high performance (MacNamara et al., 2010a; Kruyt & Grobbelaar, 2019).

Other authors (Anderson & Bushman, 2002) believe that aggression could be defined as a tendency to behave or act aggressively, which is part of the personality of an individual.

The term "aggression" characterises a high number of behaviours but, in sport, it defines either violent behaviour on the field or the commitment shown by an athlete or the entire team on the field (Crăciun, 2007).

Experts hardly define the complex concept of aggression in sport, but eventually a delimitation of the phenomenon has been reached. Specialists in sports psychology delimit the issue of aggression in three terms, namely hostile aggression, instrumental aggression and assertive behaviour, which is of great importance in professional sport (Leith, 2006).

Hostile aggression is defined as aggression whose main purpose is to injure the opponent, being accompanied by anger and the desire to cause suffering to the opponent. In the case of instrumental aggression, there is an intention to hurt the opponent, but the main goal is to receive a reward such as team victory. In terms of assertive behaviour, coaches play a key role, motivating players to show commitment during the game. (Leith, 2006)

However, it is difficult to define the concept of unsanctioned aggression in sport because inappropriate actions cannot always be distinguished from those tolerated in a sports context (Kimble et al., 2010).

Among the existing types of violence, both physical and verbal or attitude violence are noted in sports activity (Sarthou, 2010).

Currently, aggression among young people is a topical issue, many specialists approaching it in a sports context. Aggressive behaviour is part of the individual's behaviour and is also dependent on their personality (Pačesová & Šmela, 2020).

Specialists in sports psychology have concluded that certain individual characteristics such as emotional regulation, motivation, self-esteem or anxiety can shape aggressive behaviour in the sports context (Huđin et al., 2020).

There is a lot of research on the differences in the level of aggression between athletes and non-athletes, as well as between athletes who practise contact and non-contact sports (Pačesová & Šmela, 2020).

Thus, it has been shown that athletes practising contact and non-contact sports have a low level of aggression compared to non-athletes (Pačesová & Šmela, 2020; Ziaee et al., 2012; Kuśnierz et al., 2014; Fabio & Towey, 2018; Keeler, 2007).

Khan et al. (2017) explain this phenomenon by the fact that sport can teach individuals what patience, tolerance and control of emotions mean.

Martial arts and contact sports are disciplines that can easily shape the behaviour of athletes in a positive way, transmitting moral values that can reduce their aggressive

behaviour (Kotarska et al., 2019). This may explain the fact that, in most studies, there is a low level of aggression in athletes who practise contact sports.

In another study (Malinauskas et al., 2014), it has been shown that people who do not practise sports have a high level of anger and verbal aggression towards athletes.

Other studies (Boostani & Boostani, 2012) state that athletes who practise contact sports such as kickboxing have a higher level of anger, physical aggression and hostility towards swimmers, karate fighters and non-athletes.

At the same time, a low level of aggression was noticed between contact athletes towards non-athletes and a positive correlation between anxiety and contact sports (Wyckoff, 2016).

The study of the level of aggression highlighted similarities between athletes practising contact sports and those practising non-contact sports (Reza, 2012), Pačesová and Šmela (2020) highlighting the same level of physical and verbal aggression between them.

Research (Coulomb-Cabagno & Rascle, 2006; Tucker & Parks, 2001) has also been conducted between female and male athletes in terms of aggression, the results highlighting that there are no significant differences between men and women.

Studies (Keeler, 2007; Storch et al., 2003) have shown that, in sport, women generally use more verbal, emotional or relational aggression and less physical aggression.

Specialists in the field of sports psychology have concluded that gender may be a factor that determines the level of aggression in athletes. Thus, because boys commonly participate in sports with high levels of contact, their actions can be considered more aggressive than the actions of girls (Huđin et al., 2020).

Another study (Keeler, 2007) investigated the level of aggression between male and female athletes in rugby, football and volleyball, concluding that the level of aggression is similar. Other authors (Baird, 2010) believe that women tend to use more hostile aggression compared to men.

At the same time, there is an increased hostile aggression between contact sports compared to non-contact sports (Boostani & Boostani, 2012).

Some authors (Fabio & Towey, 2018; Kuśnierz et al., 2014; Malinauskas et al., 2014; Ziaee et al., 2012) have indicated that individuals who do not practise sports have a higher level of aggression compared to contact and non-contact athletes.

However, some studies (Keeler, 2007; Khan et al., 2017) have shown no difference in the level of aggression between athletes and non-athletes.

Other authors (Kotarska et al., 2019) consider that contact sports reduce the possibility of spreading aggression in an inappropriate way, especially among young people.

Older studies have shown that non-athletes have a lower level of aggression than athletes, regardless of the type of sport practised.

A high level of physical aggression and hostile aggression is revealed between athletes practising contact sports compared to athletes practising non-contact sports and non-athletes (Boostani & Boostani, 2012).

Slepička et al. (2009) classify sports according to the aggressive behaviour of athletes, thus highlighting the following categories: sports in which aggression plays an important role in athletic performance (combat sports, contact sports); sports in which aggression is not part of athletic performance but can occur during the game (football, basketball, rugby, handball); sports in which aggression can rarely occur (cycling, athletics); sports that do not allow direct

physical contact (swimming, tennis, volleyball); coordination sports in which aggression is not present (figure skating, synchronous swimming, gymnastics).

One of the most important factors of sports performance is considered to be the good functionality of the cardiorespiratory system. Endurance is therefore one of the essential components of sports success (Agus, 2020).

Resistance to aerobic exercise, also called cardiorespiratory endurance, is the body's ability to perform physical exertion for a long time with the involvement of a large amount of muscle mass in conditions of fatigue (Peric & Nikolovski, 2017). The measurement of aerobic exercise capacity can be achieved by measuring the maximum oxygen consumption.

Thus, the measurement of maximum oxygen consumption (VO2max) is used in sports as a method of assessing aerobic exercise capacity. The value of maximum oxygen consumption (VO2max) can be found by direct measurement in the laboratory or by indirect measurement methods through the application of field tests (Santtila et al., 2013).

In general, an elite athlete needs good physical condition to achieve high results (Mayorga-Vega et al., 2015), cardiorespiratory endurance having an essential role in the sports (Vehrs et al., 2007).

To perform an exercise that involves increased energy consumption, it is necessary for the athlete to have a resilient mental profile associated with a higher level of aerobic capacity (Terracciano et al., 2013).

The characteristic moments of rugby are the game phases during which players try to advance with the ball by resisting the direct opponent, as well as the sprint or high-intensity running phases. The energy required for this type of effort is provided by anaerobic sources, while for the entire effort made during the game, the energy provided by the aerobic pathways is required. In the game of rugby, the development of aerobic capacity is extremely important for both providing the necessary energy throughout the field game and restoring phosphocreatine reserves (Cîrjoescu & Tache, 2016).

A study (Rhodes & Smith, 2006) investigated the relationship between personality traits and energy consumption to determine the role of psychological processes in regulating the body's energy homeostasis and concluded that people with anxious or aggressive behaviour might have a higher resting metabolic rate, while those with a low level of conscientiousness might have lower aerobic capacity.

The aim of this paper is to investigate the correlations between aggression and the aerobic and anaerobic exercise capacity of female rugby players.

Methodology

Participants

The group of participants included in this research consisted of 20 senior rugby players, professional athletes of the CS Politehnica Iași Rugby Sevens Women's team (163.2 ± 5.9 cm, 59.7 ± 5.8 kg, 22.4 ± 1.6 kg/m2, 28.5 ± 3.1% body fat and 31.1 ± 1.5% muscle mass).

Methods

The Aggression Questionnaire (AQ) (Buss & Perry, 1992) was applied to assess aggressiveness, aerobic capacity was assessed by the VAM-Eval test (Trofin & Honceriu, 2019), and the 8 x 10 + 10 m test (Trofin et al., 2018) was used to determine anaerobic lactacid power.

Statistical analysis was performed using the GraphPad Prism 6 program by applying the Pearson correlation index.

Results

Analysis of the results for the research sample showed a maximum oxygen consumption of 49.65 ± 3.99 ml/kg/min. The effort under anaerobic conditions indicated an index of 6.91 ± 1.89%.

According to Figure 1, the highest score of aggression obtained by athletes was for hostility, and the lowest score was for verbal aggression. This result is not in line with studies in the field, which suggest that most often female athletes have a high level of verbal aggression and a low level of physical and hostile aggression.

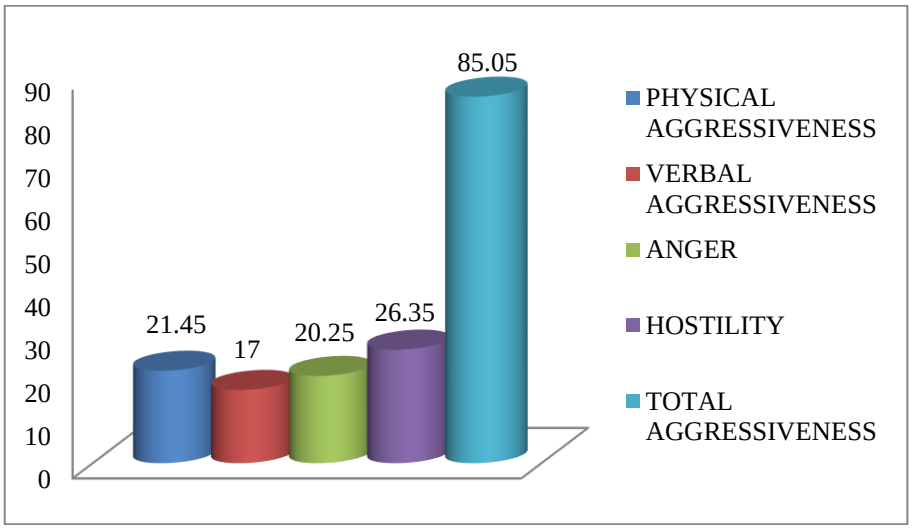

Figure 1. Average values of aggression

Thus, Table 1 shows a significant correlation ($r = 0.45$, $p = 0.04$) only between verbal aggression and aerobic exercise capacity. Hostility gets close to the threshold of significant correlation, with the other components of aggression remaining below it.

According to the identified correlation, it seems that female athletes with high aerobic capacity have an aggressive behaviour through verbal expression. This is observed in practice when maximum stress tests are applied.

Table 1. *Correlation between aggression and aerobic exercise capacity*

	VO2max (ml/kg/min) vs. Physical aggressiveness	VO2max (ml/kg/min) vs. Verbal aggressiveness	VO2max (ml/kg/min) vs. Anger	VO2max (ml/kg/min) vs. Hostility	VO2max (ml/kg/min) vs. Total aggressiveness
Pearson's r					
R	0.225	0.451	0.212	0.432	0.377
95% confidence interval	-0.242 to 0.607	0.011 to 0.745	-0.254 to 0.598	-0.013 to 0.734	-0.078 to 0.702
R-squared	0.050	0.204	0.044	0.186	0.142
P-value					
P (two-tailed)	0.340	0.045	0.369	0.057	0.101
P-value summary	ns	*	ns	ns	Ns
Significant? (alpha = 0.05)	No	Yes	No	No	No
Number of XY pairs	20	20	20	20	20

According to Table 2, there is no significant correlation between aggression and anaerobic lactacid power.

Table 2. *Correlation between aggression and anaerobic lactacid power*

	8 x 10 + 10 m (%) vs. Physical aggressiveness	8 x 10 + 10 m (%) vs. Verbal aggressiveness	8 x 10 + 10 m (%) vs. Anger	8 x 10 + 10 m (%) vs. Hostility	8 x 10 + 10 m (%) vs. Total aggressiveness
Pearson's r					
R	0.299	-0.052	0.270	-0.027	0.167
95% confidence interval	-0.165 to 0.655	-0.483 to 0.399	-0.195 to 0.637	-0.464 to 0.420	-0.297 to 0.567
R-squared	0.089	0.002	0.073	0.001	0.028
P-value					
P (two-tailed)	0.199	0.826	0.248	0.908	0.480
P-value summary	ns	Ns	Ns	ns	ns
Significant? (alpha = 0.05)	No	No	No	No	No
Number of XY pairs	20	20	20	20	20

The topic of this study is treated in the literature (Keeler, 2007; Bailey & Hurd, 2005; Van Goozen et al., 1994) but with other assessment tools, which makes it extremely difficult to relate our results to other research studies. By analysing athletes, it has been found that women have a lower aggression level than men and that a longer sports experience, which could stop aggressive behaviours, does not lead to a decrease in aggression.

Conclusion

Analysis of the results reveals a single significant correlation established between maximum oxygen consumption and the level of verbal aggression. At the same time, there is no connection between anaerobic exercise capacity and aggression parameters.

Unlike other results in the literature, which emphasise that female athletes have a high level of verbal aggression and a low level of physical aggression, rugby players participating in this study show a high level of hostile and physical aggression and a low level of verbal aggression. This can be determined by both the emotional and social specifics of the sport practised.

The research results also indicate a direct relation established between aerobic endurance and the level of verbal aggression of female athletes, which can be used in sports selection.

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