The impact of COVID-19 on the stamina of Kabaddi players: a noteworthy adverse experience

El impacto de COVID-19 en la resistencia de los jugadores de Kabaddi: una experiencia adversa digna de mención

*1 Gusti Putu Ngurah Adi Santika, **1 Putu Gede Adiati, ***Y Touvan Juni Samodra, *Maryoto Subekti, **Ketut Tirtayasa, ***Susy Purnawati, ****Dedi Suryadi, *****Asy Syam, ******Albad Sinulingga, *******Syarif Hidayat
*Universitas PGRI Mahadewa Indonesia (Indonesia), **Universitas Udayana (Indonesia), ***Universitas Tanjungpura (Indonesia), ****Universitas Negeri Yogyakarta (Indonesia), *****Universitas Negeri Gorontalo (Indonesia), ******Universitas Negeri Medan (Indonesia), *******Universitas Pendidikan Ganesha (Indonesia)

Abstract. The COVID-19 pandemic is a memorable and challenging period for the global population, particularly for athletes. The ability to train outdoors and gather in groups became highly restricted and often prohibited, leading to adverse effects. Kabaddi athletes in Bali, Indonesia, were among those significantly impacted. This group had the potential to contribute champions to the national team. The aim of this study was to assess the arm muscle endurance of Denpasar Kabaddi athletes before and during the pandemic. This research is descriptive-quantitative in nature and employed purposive sampling, involving 15 core athletes. The endurance test consisted of performing pushups for one minute. Data were analyzed descriptively to determine the average arm muscle endurance level of the athletes. Results indicated that before the pandemic, 100% of the athletes had good arm muscle endurance. During the pandemic, however, only 5 out of 15 athletes (33.33%) maintained a good level, while 10 athletes fell to a medium level. The study concluded that the arm muscle endurance of Denpasar male kabaddi athletes decreased during the COVID-19 pandemic by an average of 9.33 times per minute.

Keywords: Arm Muscle Endurance, Kabaddi, Covid-19 Pandemic

Resumen. La pandemia de COVID-19 es un periodo memorables y desafiantes para la población mundial, especialmente para los atletas. La posibilidad de entrenar al aire libre y de reunirse en grupo se vio muy restringida y a menudo prohibida, lo que provocó efectos adversos. Los atletas de kabaddi de Bali (Indonesia) fueron algunos de los más afectados. Este grupo tenía el potencial de aportar campeones al equipo nacional. El objetivo de este estudio era evaluar la resistencia muscular del brazo de los atletas de kabaddi de Denpasar antes y durante la pandemia. Esta investigación es de naturaleza descriptivo- cuantitativa y empleó un muestreo intencional, en el que participaron 15 atletas de base. La prueba de resistencia consistió en realizar flexiones durante un minuto. Los datos se analizaron descriptivamente para determinar el nivel medio de resistencia muscular del brazo de los atletas. Los resultados indicaron que antes de la pandemia, el 100% de los atletas tenían una buena resistencia muscular del brazo. Durante la pandemia, sin embargo, sólo 5 de 15 atletas (33.33%) mantuvieron un buen nivel, mientras que 10 atletas descendieron a un nivel medio. El estudio concluyó que la resistencia muscular del brazo de los atletas masculinos de kabaddi de Denpasar disminuyó durante la pandemia de COVID-19 una media de 9,33 veces por minuto.

Palabras clave: Resistencia muscular del brazo, Kabaddi, Pandemia de Covid-19

1 Gusti Putu Ngurah Adi Santika
nguragadisantika@gmail.com

Introduction

Kabaddi is a traditional sport that has been played since 4000 years ago (Majlesi et al., 2012). Kabaddi is also a way for rural people to gain muscular fitness benefits that originated in Bangladesh (Kukreja, 2023). Originally, Kabaddi was played on the ground, when it went international the game was modified for safety purposes (Ali et al., 2012). Subsequently, it was played on a mat as a base for playing (Jayakumar, 2020). Kabaddi is a team sport conducted on the basis of teamwork (Rao Kagittha & Kumar, 2013). In indoor kabaddi, each team comprises 12 players, including 7 core players and 5 reserves. The sport involves both offensive and defensive roles focused on touching and catching. In the attacking phase, a player called the "Raider" attempts to earn points by touching opponents. The number of successful touches determines the score. In the defensive phase, the team tries to catch the attacking Raider to gain points.

In a Kabaddi match, the two teams will take turns attacking. Attacking and defending will be done by both teams within 20 minutes multiplied by two rounds for 40 minutes (Kukreja, 2023). So muscle endurance is very important. Touching and catching in kabaddi sports will not be separated from the role of arm muscle endurance. So the coach must know very well how the physical abilities of his athletes, especially the important components in the sport of kabaddi, namely the endurance of the arm muscles (Figures 1 and 2).

Figure 1. The Importance of Arm Muscle Strength During Attack
As a sport that demands hard work, compared to volleyball, it turns out that Kabaddi athletes have the same level of mental health (Saiyed Subhanallah Husainbhai, 2018). Fellow national players between volleyball and Kabaddi women, based on the questionnaire given by Kabaddi athletes, have higher mental toughness (Yadav, 2014). Two other studies have shown that female Kabaddi athletes are more intelligent than their judo and wrestling counterparts (Kumar, 2017). Compared to handball and kabaddi athletes in Iraq, it turns out that the level of social intelligence of athletes in these two sports is the same, as assessed by cooperation, patience, level of trust, sensitivity, sense of humor, and concern for the social environment (Merajuddin Faridi, 2022). So this sport has the potential to develop and foster a person's physical and spiritual potential.

Physical capacity is a determinant of sports performance (Rubiyatno et al., 2023; Suryadi, Komaini, Suganda, et al., 2024; Suryadi, Nasrulloh, Haryanto, et al., 2024; Suryadi, Susanto, Faridah, et al., 2024). With a good physical proportion, a good physical condition will also be realized (Hardinata et al., 2023; Okilanda et al., 2023). A study found that Kabaddi sports require agility, speed, and high vertical jump ability (Patni et al., 2018). Where kabaddi athletes must have strength and endurance as well as good flexibility, this finding is based on a comparison of kabaddi athletes with Kho-kho. It is also important to have good posture and strength, as kabaddi players are taller, heavier, bulkier, and have high grip strength (Pramanick et al., 2022). Furthermore, kabaddi athletes also require explosive power of the lower limbs as well as ankle joint flexibility for effective touching in kabaddi games.

Fitness studies among kabaddi athletes found that after measurement, height, weight, arm span, abdominal muscle strength, leg explosive strength, speed, and agility had similar characteristics (Biswa & Halder, 2015). Other research states that strength, coordination ability, agility, power, speed, and cardiovascular lung endurance are required (Bhat et al., 2019). It turns out that physiological characteristics such as vital capacity, blood pressure, pulse, and respiration are also of concern (Kumar & Chaudhary, 2022). Kabaddi is a physical contact sport that requires muscular strength and endurance to achieve maximum reflex movement (Park & Kim, 2020).

The coronavirus pandemic outbreak has caused uncertainty about the future of sports during the Covid-19 pandemic (Sanderson & Brown, 2020). Physical education lessons also receive the same influence, there is a congestion of matches and economic congestion (Drewes et al., 2021). Fear of infection and transmission, if you use a mask, has a heavier impact on performance in physiology (Wong et al., 2020). This provides a pattern of change in physical activity participation that becomes irregular, which causes a decrease in fitness (Rubiyatno et al., 2023; Suryadi, Nasrulloh, Yanti, et al., 2024; Suryadi, Okilanda, Nofrizal, et al., 2024). So that it makes its own problems, especially stress in sports players or the world soccer crisis, both in the Olympic and UEDA EURO competitions (Parnell et al., 2020).

The study explains that increasing endurance is done with continuous training for kabaddi athletes. Both circuit training and circuit weight training can equally increase the strength and endurance of kabaddi athletes, training is carried out for nine weeks (Vadivel & Maniazhagu, 2022). This exercise becomes difficult in the Covid period, so this condition becomes a dilemma. Related to this, as a game that requires touch with the feet or hands for a long duration, endurance is very important.

This research tries to reveal exactly how much this endurance will decrease during the pandemic when compared to the conditions before Covid-19. Considering that during Covid-19, with restrictions on gathering, training becomes very difficult to do simultaneously. The expression of longing to be able to practice as before in the uncertainty of Covid-19 (Scerri & Grech, 2021). Trapped in helplessness in the face of Covid-19 related to sports (Scerri & Grech, 2021). Very special attention will be needed later, if this pandemic has ended, to restore the fitness of athletes, especially junior athletes. Some people are happy with team sports for men and recreational sports for women, but with Covid-19, this becomes extremely difficult, especially given the difficulty of providing an environment for training.

Related to this, the coach checks the athlete's physical condition, starting with the measurement of the athlete's arm muscle endurance. Arm muscle endurance is done none other than because arm muscle endurance is a muscle endurance that must be well maintained before doing joint training. Without good arm muscle endurance, athletes can get injured when doing kabaddi techniques, including hand touch and ankle hold techniques. The role of arm muscle endurance is very important in both techniques, so the coach requires checking the physical condition starting from the stage of checking arm muscle endurance. The role of arm muscle endurance is expressed by (Sanjit & Pandey, 2016), who said kabaddi is a sport that requires speed with good muscle endurance.

In the sport of Kabaddi, segment strength and overall body strength are essential for optimal performance. The relationship between segment strength and overall body
strength in the sport of Kabaddi is that optimal segment strength helps improve overall body strength. By having balanced muscle strength in the various segments of the body, a player can move their body more efficiently and effectively (Torbatinzhad et al., 2019). This allows them to perform technical movements with sufficient strength and also reduces the risk of injury due to unbalanced strength. It is important to note that besides physical strength, other aspects such as technique, strategy, endurance, and agility are also important in Kabaddi (Ram & Singh, 2021). However, segment strength and overall body strength remain an important foundation for good performance in this sport. Training focused on developing segment strength and overall body strength can help players improve their performance on the Kabaddi court. Therefore, this study aims to determine, how the conditions before and during the pandemic, the level of endurance of the arm muscles of Denpasar Kabaddi athletes during the Covid-19 pandemic.

**Methods**

**Participants**

This research was conducted on May 17, 2020. The research subjects were 15 male Denpasar Bali kabaddi athletes. The sampling technique used in this study was purposeful sampling, namely male athletes from Denpasar Bali Kabaddi.

**Research Design**

This research is a descriptive-quantitative research. Quantitative is intended to calculate data with statistical tests. The instrument in this study was to give tests and measurements to the sample. The measurement given is push up for 1 minute. The initial data of the study was obtained before the occurrence of Covid-19, when athletes conducted measurement tests for the 2019 Provincial Pre-Sports Week event. Where the data that has been obtained through measurement will be compared with the data before the Covid-19 pandemic.

**Statistical analysis**

Data analysis was carried out by conducting descriptive tests to determine the average level of arm muscle endurance of Denpasar kabaddi athletes. The analysis in this study went through the descriptive test stage, the prerequisite test and used a t-test. The analysis in the study was assisted using the SPSS 26 application. As for later it will be categorized into the norms in table 1 as follows:

### Results

Based on measurements taken online, the measurement data for arm muscle endurance is as follows:

Based on the results of the analysis above, it can be seen that the percentage of the level of arm muscle endurance of male Denpasar kabaddi athletes before the pandemic was 100% good, during the pandemic, Dri owned 15 athletes, of whom 5 were at the "good" level, or with a percentage of 33.33%. While 10 people are at the "medium" level. If we compare the arm muscle endurance of male kabaddi athletes in Denpasar city before the National Championship in December 2019, 14 people, or 93.33% of athletes, were at the "good" level, and 1 person, or 6.66% of athletes, were at the "excellent" level. This shows a decrease in the physical condition of the Denpasar kabaddi male athletes, especially in arm muscle endurance. Results can be seen in table 2, 3 and figure 3.

### Table 2. Measurement Data of Arm Muscle Endurance of Denpasar Kabaddi Male Athletes

<table>
<thead>
<tr>
<th>No.</th>
<th>Name</th>
<th>Push-Up (times/minute)</th>
<th>Norma</th>
<th>Push-Up (times/minute)</th>
<th>Norma</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>DMR</td>
<td>58</td>
<td>Good</td>
<td>40</td>
<td>Average</td>
</tr>
<tr>
<td>2</td>
<td>BDA</td>
<td>61</td>
<td>Good</td>
<td>59</td>
<td>Good</td>
</tr>
<tr>
<td>3</td>
<td>KJI</td>
<td>56</td>
<td>Good</td>
<td>40</td>
<td>Average</td>
</tr>
<tr>
<td>4</td>
<td>MPA</td>
<td>53</td>
<td>Good</td>
<td>50</td>
<td>Average</td>
</tr>
<tr>
<td>5</td>
<td>JTR</td>
<td>60</td>
<td>Good</td>
<td>43</td>
<td>Average</td>
</tr>
<tr>
<td>6</td>
<td>GRR</td>
<td>65</td>
<td>Good</td>
<td>41</td>
<td>Average</td>
</tr>
<tr>
<td>7</td>
<td>PST</td>
<td>58</td>
<td>Good</td>
<td>53</td>
<td>Good</td>
</tr>
<tr>
<td>8</td>
<td>JKW</td>
<td>61</td>
<td>Good</td>
<td>45</td>
<td>Average</td>
</tr>
<tr>
<td>9</td>
<td>PMA</td>
<td>57</td>
<td>Good</td>
<td>47</td>
<td>Average</td>
</tr>
<tr>
<td>10</td>
<td>YJF</td>
<td>59</td>
<td>Good</td>
<td>50</td>
<td>Average</td>
</tr>
<tr>
<td>11</td>
<td>IGS</td>
<td>65</td>
<td>Good</td>
<td>57</td>
<td>Good</td>
</tr>
<tr>
<td>12</td>
<td>DSS</td>
<td>61</td>
<td>Good</td>
<td>57</td>
<td>Good</td>
</tr>
<tr>
<td>13</td>
<td>ELF</td>
<td>58</td>
<td>Good</td>
<td>48</td>
<td>Average</td>
</tr>
<tr>
<td>14</td>
<td>DWJ</td>
<td>61</td>
<td>Good</td>
<td>55</td>
<td>Good</td>
</tr>
<tr>
<td>15</td>
<td>DAT</td>
<td>64</td>
<td>Good</td>
<td>41</td>
<td>Average</td>
</tr>
<tr>
<td></td>
<td>Average</td>
<td>59.8</td>
<td>48.4</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>min</td>
<td>53</td>
<td>40</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>max</td>
<td>65</td>
<td>59</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

![Percentage of Kabaddi Athletes](image_url)
Based on the results in table 4, the results show a normality test with a significance value (p > 0.05), it can be concluded that the data is normally distributed and can be continued using a parametric difference test.

Furthermore, the results of the independent sample test provide significance information of 0.000 < 0.05 which means a significant difference. Based on these results, it can be concluded that there is a significant difference in the ability of arm muscle endurance before and in Covid-19. These results also provide evidence that in Covid-19 the ability of arm muscle endurance in Kabaddi athletes has decreased. The results can be seen in table 5 and figure 4.

### Table 4.

Kabaddi Endurance Normality Test Results

<table>
<thead>
<tr>
<th>Group</th>
<th>Kolmogorov-Smirnov a</th>
<th>Shapiro-Wilk</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Statistic</td>
<td>df</td>
</tr>
<tr>
<td>Before</td>
<td>0.160</td>
<td>15</td>
</tr>
<tr>
<td>During the Pandemic</td>
<td>0.133</td>
<td>15</td>
</tr>
</tbody>
</table>

### Table 5.

Test Results of Arm Muscle Endurance before and In Covid-19

<table>
<thead>
<tr>
<th>Arm Muscle Endurance</th>
<th>Equal variances assumed</th>
<th>Equal variances not assumed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Result</td>
<td>F</td>
<td>Sig.</td>
</tr>
<tr>
<td></td>
<td>9.409</td>
<td>0.005</td>
</tr>
<tr>
<td></td>
<td></td>
<td>5.915</td>
</tr>
</tbody>
</table>

The aim of the research was to assess the extent to which arm muscle endurance levels among male Kabaddi athletes from Denpasar had changed during the pandemic period. Considering that athletes engage in independent training without direct supervision, understanding the athletes’ physical fitness status, particularly their arm muscle endurance, becomes crucial. The findings indicated a notable disparity in arm muscle endurance among Kabaddi athletes before and during the Covid-19 pandemic. Additionally, the results indicate a decline in the athletes' arm muscle endurance capabilities during the Covid-19 pandemic. Prior research suggests that Covid-19 has impacted various facets of life, including sports, and consequently affecting athletes as well (Hidayat, 2022).

Kabaddi athletes are also one of the sports prone to injury (John et al., 2016). Injuries in kabaddi are 21.25% to the knee, 14.25% to the waist, 26.25% to the shoulder and arm, and 13.75% to the ankle (25). Possible injuries are to the knee (Pal et al., 2020). Possible injuries are to the knee (Gupta et al., 2020), and vocal cord disorders (Ebrahimi & Gholami, 2020). So prevention of injury based on biomechanical studies is very necessary. One of the efforts to reduce injuries is to increase strength and flexibility. These two things are at least able to later maintain activities with high power. Some very important biomotor components of kabaddi athletes are flexibility (Shrivastava et al., 2022), high endurance and strength (Sudhakar et al., 2014), agility, speed and flexibility, and body weight (Devaraju & Kalidasan, 2012). Based on this study, it can be understood that kabaddi athletes require excellent biomotor skills. This biomotor condition by itself will fluctuate if not regularly practiced. Meanwhile, in Covid-19 conditions, the decrease in the level of endurance of the arm muscles is due to the lack of training portions.

Another review indicates that various strategies have been implemented to enhance the biomotor components of athletes. For instance, combined strength and plyometric training methods have yielded positive outcomes in improving speed and power among male kabaddi athletes (Rao & Kishore, 2014). Moreover, yoga activities have been shown to influence resting pulse rate, blood pressure, and breath-holding ability, as demonstrated in a study involving 22 kabaddi athletes (Kumar Prasad Rahul & Dhapola Mahesh Singh, 2015). Training regimens focusing on speed, agility, and quickness, along with high-altitude training, have led to improvements in breath-holding ability after 12 weeks of training, conducted three times per week (Hijam & Muthueleckuvan, 2018). Additionally, circuit training over a 12-week period has been found to enhance the VO2max capacity of kabaddi athletes (Balasingh & Night, 2018). Furthermore, interventions involving speed, agility, and core training exercises using weight training have positively impacted balance and quickness in kabaddi athletes (Kanagaraj Scholar et al., 2019). However, all these recommendations have been affected by the Covid-19 pandemic.

Other research studies state several things related to...
the condition of Covid-19 that has passed in relation to sports activities. In China, covid puts its own pressure on the sports industry and athletes, especially team sports (Li, 2022). In Indonesia, Covid-19 also had a fatal impact and made people unable to carry out sports activities (Fajar et al., 2021). What developed during covid-19 was gaming, which declared itself as e-sports, which in fact was gaming, increase the amount of gambling that occurs in Britania (Wardle et al., 2021). As a result of not being able to compete, aside from athletes, it also has a severe impact on the small economy that supports sports activities. A study revealed that the conditions of covid-19 really provide tremendous changes for all sports stakeholders, namely congestion (Guotuan et al., 2022). More real sports experience a period of ghost games, where there are no matches and no spectators. Even sports in the gym have closed.

There is a reduction and even elimination of competition and stop practicing, resulting in detraining. Furthermore, a decrease in fitness capacity and an increase in BMI (Wati et al., 2023), a decrease in mental health in athletes, pressure on the economy and athletes (Li, 2022). The statement can be concluded that not meeting the need for activity has an impact on the mental health of athletes. The positive impact is that there is time to relax for the coach, but there is a decrease in practice, skills, mental health (Battaglia & Kerr, 2023). The results of this study state that the condition of kabaddi athletes in Bali Indonesia has decreased, the exercise recommendations suggested by the researcher are difficult to do because of the impact of joint activity restrictions. Covid-19 in the memory of the sports community has destroyed biomotor, and increased high stress levels.

Conclusion

Based on the aforementioned discussion, it can be concluded that the endurance level of male kabaddi athletes from Denpasar decreased by 9.33 times per minute during the Covid-19 pandemic. Therefore, the observed decline in the endurance level of arm muscles among Denpasar kabaddi male athletes during the Covid-19 pandemic is valid. This decline is understandable considering the circumstances and the lack of monitoring of athletes during the pandemic. It serves as a reference point for coaches to enhance program effectiveness, ensuring that athletes are in optimal condition for the upcoming Bali Provincial Sports Week event in 2022. Sports coaches are advised to continually monitor the physical development of their athletes and provide motivation to maintain training regimens under any circumstances, particularly during the challenging period of the pandemic when online monitoring is difficult. This underscores the importance of adapting to new habits, such as the "new normal," while ensuring that coaches can effectively monitor athletes' physical conditions to uphold their peak performance.

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