INVESTIGATING THE PREVALENCE OF MUSCULOSKELETAL SYSTEM INJURIES IN PARKOUR

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ABSTRACT

Parkour is a sport (extreme forms of physical activity) that consists of crossing barriers using body skills. Few studies investigated the prevalence of injuries in this sport. This study aimed to identify the frequency and site of injury in the body of the individuals practicing Parkour in Iraq. We conducted an observational study that consisted of (200) individuals. The two researchers distributed the questionnaire form to the athletes and explained the questionnaire before being answered by the players, and confirmed that the answer must be clear and realistic for the purpose of scientific credibility. The data were processed statistically, and the results showed that the site of injury was more common in the ankle, followed by the knee, the foot and the thigh, the hand and shoulder, and finally the wrist and neck. It was clear that all injuries directly affect the performance of the Parkour athletes, but there is a variation in the type of injury, as the highest injuries affected by performance were muscle spasms and acchymosis, followed by muscle tears, then bruises, calcifications, dislocations and sprains. Further studies should be conducted in order to develop preventive strategies for this sport.

Keywords: Parkour, Injury, Upper Limb, Injury Prevention.

1. INTRODUCTION AND THE RESEARCH PROBLEM

Parkour is a new extreme sport (broadly speaking, it refers to the extreme forms of physical activity (4:16), represented by overcoming the obstacles in the environment using body skills, such as jumping and climbing. The word is derived from the French language which means "tracing a path". The males practicing this sport are referred to as "traceur", while the females practicing it are referred to as "traceuse" (18:891) (20:251).

The history of this sport dates back to the late 1980s, where its founders used to practice gymnastics and self-defense techniques (19:757) (21:127). However, the most important effect on the development of the sport was based on the natural method of George Herbert (3:169). Herbert had a great pioneering role in developing modern Physical Education, where he developed a training system that is based on principles, such as courage, action and altruism (3:169) (8:293). He described "natural skills" and classified them into (10) different categories: walking, running, quadruped, climbing, Jumping, balance, lifting and carrying, throwing, defense, and swimming (19:60). Just as in other countries, parkour was distinctly practiced in Brazil due to the advent of the Internet and new action films. Just like other sports, particularly those involving competition and high performance, injuries are common in the musculoskeletal system (10:47) (15:73), and no parkour competitions prevent obtaining data about injuries; however, it is logical that such a sport would involve a high percentage of injuries. Few studies stated that there are injuries in the sport of parkour (9:576) (22:169), and there is no consensus about the factors that may expose participants to injuries. This case intervenes with the developments in practicing parkour and the complexity of using the appropriate preventive strategies. The current study aimed at identifying the frequency and sites of injuries among those practicing the sport of parkour in Iraq. Since the authors are educators, where one of them teaches biomechanical gymnastics and is a trainer of parkour, and the other is specialized in kinetic learning in gymnasium, and given that parkour has become a branch of gymnastics, we noticed that most gymnastics athletes are exposed to injuries while practicing the sport of parkour.

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Therefore, the authors conducted this study in order to identify the causes and types of the most important injuries to which parkour athletes are exposed in order to set the appropriate solutions for the problem and do more efforts to apply them in reality in the near future.

The Study Objectives

1. Identifying the types of injuries to which parkour athletes are exposed and the most common injuries among them.

Study Hypotheses

2. What is the most common injury among the athletes of parkour?

3. There is a significant relationship between injuries and performance in the sport of parkour.

The Study Domains

- The human domain: the athletes of parkour in Iraq, with a total of (200).
- Spatial domain: Iraq.

The study methodology and field procedures:

II. STUDY APPROACH

The nature of the problem determines the followed approach in order to conclude the results. The authors used the descriptive approach due to its compatibility to the nature of the study problem.

Study Population and Sample

The study population was chosen purposively and consisted of parkour athletes in Iraq with a total of (200) athletes. After applying the questionnaire to determine the number of injured athletes, the number was (85) injured athletes who represented the study sample with a percentage of (43%) of the total study population.

Used Instruments and Methods

1. Arabic and foreign references.
2. A questionnaire about the causes of the most important injuries.
3. A video tape for the athletes in the domain of performing parkour movements.
4. Three arbitrators to provide the score.

Steps of Implementing the Research

The researchers developed a questionnaire to identify the causes and types of sports injuries among athletes. The questionnaire showed in appendix (1) consisted of (5) questions concerning the most influential injury on the performance of parkour movements among athletes. The final score was (10), set by the three arbitrators, where the average score is adopted as the ultimate score of athletes.

Pilot Study

The authors conducted the pilot study to a sample that consisted of (4) athletes from the governorate of Basra, taken from the study sample on 16th, March, 2021 in order to identify the most important obstacles facing the research application.

Main Study

The authors distributed the questionnaire to the athletes on 5th, April, 2021 after demonstrating the objectives of the questionnaire and confirmed that the responses should be accurate and clear for the purposes of scientific
validity. The authors sent a video concerning the kinetic performance to arbitrators in relation to setting up the scores that will be adopted by the authors.

**Statistical Methods:** (SPSS) Was Used for Statistical Analysis

- Percentage and frequency
- Kruskal-Wallis

### III. DISPLAYING, ANALYZING AND DISCUSSING THE RESULTS

#### 3.1 Displaying and Analyzing the Results

**Table 1.** The Percentage of the Number of Parkour Athletes

<table>
<thead>
<tr>
<th>Question</th>
<th>Answer</th>
<th>Number of frequencies</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Have you ever been injured while practicing parkour?</td>
<td>Yes</td>
<td>85</td>
<td>43%</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>115</td>
<td>58%</td>
</tr>
</tbody>
</table>

Table (1) showed that the percentage of being exposed to injury among the athletes of parkour was (43%) out of the total population that consisted of (200) athletes; this is considered as a good percentage since more than half of the athletes were not exposed to injuries.

**Table 2.** The Percentage of the Injury Location

<table>
<thead>
<tr>
<th>Question</th>
<th>Injury site</th>
<th>Number of frequencies</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>What is the location of the injury?</td>
<td>Knee</td>
<td>13</td>
<td>15.29%</td>
</tr>
<tr>
<td></td>
<td>Foot</td>
<td>12</td>
<td>14.12%</td>
</tr>
<tr>
<td></td>
<td>Ankle</td>
<td>14</td>
<td>16.47%</td>
</tr>
<tr>
<td></td>
<td>Thigh</td>
<td>12</td>
<td>14.12%</td>
</tr>
<tr>
<td></td>
<td>Wrist</td>
<td>7</td>
<td>8.24%</td>
</tr>
<tr>
<td></td>
<td>Hand</td>
<td>10</td>
<td>11.76%</td>
</tr>
<tr>
<td></td>
<td>Shoulder</td>
<td>10</td>
<td>11.76%</td>
</tr>
<tr>
<td></td>
<td>Neck</td>
<td>7</td>
<td>8.24%</td>
</tr>
</tbody>
</table>

Table (2) shows that ankle injuries were the highest with a percentage of (16.37%), followed by knee injuries (15.29%), then foot and thigh with a percentage of (14.12%), hand and shoulder (11.76%) and finally wrist and neck with a percentage of (8.24%).

**Table 3.** The Percentage of the Injury Type

<table>
<thead>
<tr>
<th>Question</th>
<th>Injury site</th>
<th>Number of frequencies</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>What is the most common injuries to which you are exposed while practicing parkour?</td>
<td>Ecchymoses</td>
<td>18</td>
<td>21.18%</td>
</tr>
<tr>
<td></td>
<td>Break</td>
<td>2</td>
<td>2.35%</td>
</tr>
<tr>
<td></td>
<td>Calcification</td>
<td>7</td>
<td>8.23%</td>
</tr>
<tr>
<td></td>
<td>Sprains</td>
<td>5</td>
<td>5.82%</td>
</tr>
<tr>
<td></td>
<td>Spasms</td>
<td>25</td>
<td>29.41%</td>
</tr>
</tbody>
</table>
Table (3) showed that the highest ratio of injuries experienced by the athletes of parkour is related to spasms with a percentage of (29.41%), followed by ecchymoses (21.18%), then myorrhexis (14.12%), bruises (11.8%), calcification (8.23%), dislocation (7.06%), sprains (5.82%), and finally, breaks (2.35%).

Table (4) shows the impact of injury variations on performing the sequence of ground movements based on means, rank average and Kruskal value at a significance level of (0.05).

<table>
<thead>
<tr>
<th>Injuries</th>
<th>Number</th>
<th>Mean</th>
<th>SD</th>
<th>Average rank</th>
<th>Kruskal value</th>
<th>Probability value</th>
<th>Sig. level</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ecchymoses</td>
<td>18</td>
<td>5.61</td>
<td>1.79</td>
<td>52.28</td>
<td>18.265</td>
<td>0.011</td>
<td>Significant</td>
</tr>
<tr>
<td>Break</td>
<td>2</td>
<td>5.5</td>
<td>0.71</td>
<td>53.75</td>
<td></td>
<td></td>
<td>Significant</td>
</tr>
<tr>
<td>Calcification</td>
<td>7</td>
<td>5.428</td>
<td>1.51</td>
<td>46.14</td>
<td></td>
<td></td>
<td>Significant</td>
</tr>
<tr>
<td>Sprains</td>
<td>5</td>
<td>5.2</td>
<td>1.92</td>
<td>45.80</td>
<td></td>
<td></td>
<td>Significant</td>
</tr>
<tr>
<td>Spasms</td>
<td>25</td>
<td>5.92</td>
<td>1.87</td>
<td>51.28</td>
<td></td>
<td></td>
<td>Significant</td>
</tr>
<tr>
<td>Myorrhexis</td>
<td>12</td>
<td>4.75</td>
<td>1.42</td>
<td>27.13</td>
<td></td>
<td></td>
<td>Significant</td>
</tr>
<tr>
<td>Dislocation</td>
<td>6</td>
<td>4</td>
<td>1.26</td>
<td>18.50</td>
<td></td>
<td></td>
<td>Significant</td>
</tr>
<tr>
<td>Bruises</td>
<td>10</td>
<td>4.8</td>
<td>1.32</td>
<td>33.60</td>
<td></td>
<td></td>
<td>Significant</td>
</tr>
</tbody>
</table>

*statistically significant at (0.05)

Table (4) shows that the average rank for the first group (ecchymosis) was (52.28), the second group (breaks) was (53.75), the third group (calcification) (46.14), the fourth group (sprains) (45.80), the fifth group (spasms) (51.28), the sixth group (myorrhexis) (27.13), the seventh group (dislocation) (18.50), and finally the eighth group (bruises) (33.60). Kruskal value was (18.265), with a probability value of (0.011), indicating the significance of differences for all the injuries, where any types of injuries directly affect performance and score. However, there is a variation regarding the type of injury, frequency of occurrence and its impact on performing parkour movements. For example, the fifth group related to spasms are the most common and most frequent injuries. The authors attribute that to the increased training during lessons in a manner that doesn't correspond with the students' abilities and physical preparation. This finding agrees with (Kamal AbdulHamid, 1984), which suggested that cramp injuries are attributed to intensive training to the maximum limit or to low physical preparation (2:197).

The authors suggested that ecchymosis are caused by being exposed to external powers that are beyond the athlete's tolerance or by crashing into a hard object. The authors suggested that myorrhexis is attributed to the sudden quick movements while performing ground movements or to the lack of warming up. This finding agrees with (Sawsan AbdulMin'im, 1977), who revealed that warming up increases the body temperature and increases the flexibility of ligaments, and thus reduces the possibility of myorrhexis (1:64). Based on data analysis, we found that parkour is a sport mainly practiced by males, and could be considered as a popular sport, given the popularity of some professional athletes who practice this sport. However, most athletes practicing this sport suggested that they were exposed to injuries in muscles and bones during their practice of the sport of parkour.

In a recent study, Puddle, et al (27:122) suggested that landing strategies in Parkour are less straining while touching the ground in comparison with the traditional approach which could reduce the risk of injury. However, several reports of injuries concerning parkour are related to broken bones (11: 797) (3:12) (6:250).
(McLean, et al) (11: 797) reported an injury to the leg and distal fibula of a 13-year-old parkour athlete. In another study, (Domoiny and Miller) (13: 65) reported a severe injury to an 18-year-old teenager who had several breaks, a dislocation in the middle of the left foot and a dislocation in the index finger after falling from a high place. However, (Frumkin, et al) reported a dual-breaking in the calcaneus to a 19-year-old man. (McLean et al) also reported two other cases: a 13-year-old parkour athlete and a 15-year-old teenager with a break in the right collarbone in the middle of the spine (3:12).

Few studies addressed the prevalence of parkour injuries and conflicting results were concluded about that. (Wanke et al) (13:63) conducted a study on a sample of (266) parkour athletes and found that there are 1.9 severe injuries annually and the upper limbs are more exposed to injuries with a percentage of (58%) . The findings are impressive since the current study suggested more prevalence of injuries in the lower limbs (57.1%). However, it wasn't possible to notice whether the different training techniques will be responsible for such differences.

Parkour could be considered as a highly-risky sport in terms of injuries (6:231). However, as compared to the other non-extreme sports, we noticed that parkour had similar rates of musculoskeletal injuries. For example, in a study conducted on a sample of gymnastics professionals and hobbyists, the results revealed that the rate of injury was (76.7%) (7:8). In another study, the rate of injury was (79%) during an observation period of six months [15]. Therefore, we can see that the rate of injury in Parkour is equivalent to that in other sports, which are believed to be less harmful.

IV. CONCLUSIONS AND RECOMMENDATIONS

Conclusions

1. The prevalence rate of injuries in the sport of parkour is high in the lower limbs.

2. The results revealed that the highest prevalence of injuries was in the ankle followed by the knee, foot, thigh, hand and shoulder and finally, wrist and neck. The results showed that all the injuries directly affect the performance of parkour athletes.

3. There is a variation in the type of injury, where spasms were the most common injuries, followed by ecchymosis, myorrhexis, bruises, calcification, dislocation and sprains.

Recommendations

1. Further studies should be conducted in order to develop a preventive strategy for this sport.

2. Coaches should have a good knowledge about sports medicine, injuries and their types, the way through which they occur and the way of avoiding their occurrence, so that they can give advice and instructions to athletes while practicing the sport of parkour.

Arabic Resources

1. Sawsan AbdulMin'im, et al, biomechanics in sports domain, the house of knowledge, Cairo, 1977.

2. Kamal AbdulHamid Ismail, the injuries of jumping foot among the players of handball under 19 years old, the conference of sports for all, the faculty of Physical Education for Boys, Cairo, 1984.

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