INTRODUCTION

In this study, the game of golf was taken as the subject of investigation, in which the effects of shoulder flexibility on the players' performance was used as a measurement. The accuracy of the performance was determined based on the ability or ‘skill’ of the golfers. In this study, the term ‘skill’ can be defined as an action or task that has a specific goal to achieve. It is also defined as an indicator of the quality of performance. This skill represents how good the players are and will also reflect the experience of practice that leads the players to become a master in certain parts or skills of the sports.

According to Hill (2005), Rockwood (2008), Johnsan (2008), and Schlacter (2008), one of the factors that determines a successful golf’s swing is the flexibility of the golfer. The word ‘flexibility’ refers to being able to move the joint freely in full range of motion (ROM) so that it can perform better (Sharpe et al., 2004). Static and dynamic are two types of flexibility. Static flexibility is the range of motions which is achieved by a slow and steady stretch to the limits of the joints involved, while dynamic flexibility is when the range of motions obtained when one is rapidly moving a body part to its limits. There are many different and specific types of test for each joint. It has been proven by several studies that when a muscle is pre-stretched before doing an activity that requires it, the production of force can be greater than usual. This can enhance a person’s performance in a game as well as lessen injuries.

ABSTRACT

The effects of sports are important because it will help the players to perform their best in games and events. The purpose of this study was to examine the effectiveness of shoulder flexibility on the golfers’ performance. The participants of this study were 30 golfers; these were the people who got their handicap cut or license to play golf at the golf course. The researchers employed the experimental method to gather relevant data. The test performed included shoulder rotation test and driving range test. The data were analyzed using descriptive and inference statistics to investigate the relationship between shoulder flexibility and the golfers’ performance. The findings of the study revealed that there are strong relationships between shoulder flexibility and golfers’ performance. Apart from that, shoulder flexibility was found to be not affected by the age of the golfers and that the performance of the golfers would only be known by their handicap. It is hoped that this new knowledge will be beneficial to all golfers and instructors. It is also suggested that future studies include respondents’ motivation and cooperation so as to attract their interest in the study. The subjects also need to be clarified of the objectives and the purpose of the study in relation to their performance.

Keywords: Golfers, flexibility, performance, shoulders, swing
Crespo et al. (2003) and Sharpe et al. (2004) state that flexibility is a common thought when in training. It is a normal situation when a player has a full range of movements in some areas of the body, while the rest of the body parts may have average or limited flexibility. Bone structure, connective tissue, muscle bulk, and skin could be the causes of limited flexibility. Although flexibility is dependent on soft tissues, it is very much linked to the development of the physical fitness. A healthy person is associated with high degree of flexibility, which indicates that the more flexible a person is, the healthier he or she is. However, the increase in age has been reported to decrease flexibility because it ranges according to age, gender, and involvement in physical activities (Alter, 1996). According to Sharpe et al. (2004), flexibility begins to decline at as young as 10 years old. Mitchell et al. (2003) found that older golfers’ ROM was reduced for both shoulders when compared to college golfers. Other than that, research has also found that flexibility imposes several effects on certain players’ performance. In more specific, previous studies have found that flexibility is only to identify the flexibility in specific sports. Miller (2002) defines flexibility as the ability of an individual to move the body joints through a maximum ROM without undue strain.

The shoulder usually shows how good the player could swing by placing the golf ball during the games in a better situation. The flexibility of the shoulder will help the player to achieve a better swing and stroke in order to beat the opponent during the games (Wilson, Elliot & Wood, 1992). According to Wilson, Elliot & Wood (1992), the most research done indicates that the ‘swing’ and the combination of the shoulders’ movements produce a better swing accuracy which the player wants to send the ball. “Flexibility permits greater energy storage.” Brandon (2010) agrees that the increase of flexibility is related to augmented force production during movements. According to Bremer (2005), the measurement of flexibility is determined by the amount of movements around a joint in the body. Tight muscles can restrict one’s movement in the limb, and this automatically restricts the motion range movement. Thus, good flexibility and range of motion are important not just for active people but also for normal people to ensure a smooth run of their daily activities run.

In addition, flexibility is extremely important for golfers because poor flexibility will put them at risk of injury, especially if the golfers are under train or they go overbroad during practice or competition. Injuries are also likely to happen to golfers who have a very flexible upper body, but totally ignoring the lower part of body. As indicated earlier, stretching is essential before the start of any game as it can help decrease injury during the game. Stretching should be balanced with proper strength, and no stretch should be carried out beyond the range of motions that the players use in the golf game. Hammond (2004) states that “future injuries can be lessened or prevented with modifications of the golf swing.” According to Elliot (1999), sufficient amount of flexibility can increase the golfers’ performance throughout the range of movements. Apart from that, flexibility also produces a better force because a stretched muscle stores elastic energy and releases it when it is shortened. Lephart et al. (2007) agrees to the finding that flexibility and physical adaptations can improve golfers’ performance in playing. Flexibility and performance must have a good relationship so as to determine the achievement of athletes (Grant et al., 2001).

Elliot (1999) states that “from a movement view point, golf is a ballistic in nature, and high levels of flexibility are needed in order for athletes to place themselves into positions where they can hit the ball more powerfully. High levels of flexibility to be able to accelerate the golf club thought the greater ROM when executing the shot. Flexibility is specific to each joint; a player might have an extensive range of movement in some areas of the body and below average flexibility in other areas.” Many golf experts believe that little flexibility can cause laxity in the joint, dislocation problems, cooperation strength and reduction of swing efficiency when driving a golf ball. Thus,
The Effects of Shoulder Flexibility on the Golfers’ Performance

Flexibility exercises should be performed to help maintain fluid movement through a complete range of motions for a particular swing motion. In addition, golfers’ good swings are determined by the way the players hold the clubs. Holding the club correctly in a good position can help the players to swing and drive the golf ball with more force, as well as to control and place the ball accurately to reach the green flag. The flexibility of the shoulders will help the players to attain better swing and stroke in order to beat the opponents during the games. Meanwhile, gripping the club in a correct position is the first basic component that helps a golfer to play in a better way. Therefore, it is important for the players to know and possess this basic skill.

According to Schlacter (2008), exercising helps the muscles to develop greater flexibility, which is important for golfers who wish to increase their golfing scores. Exercising such as weight lifting can make golfers become stronger and attain more flexibility so that they can make good and full swings. Rockwood (2008) states that flexibility is very crucial for golfers as it will determine the range of motions needed for swing in the golf game. Meanwhile, Johnsan (2008) indicates that flexibility and strength are the most important factors when playing golf because they determine the golfers’ development of balance, skill, stability, and the coordination. In other words, the game can improve dramatically when flexibility is taken care of. Stretching and exercising is the key to a better flexibility for golfers. Lower back and shoulder muscles must be the centre of concentration for golfers as these two areas are the most important body parts for them (Rockwood, 2008).

Good exercises need to be done regularly to avoid or lessen low back pain. Schlacter (2008) explains that “a good exercise to prevent low back pain is to lie on one’s stomach on a hard surface, with the hands on both sides. Raise the upper body, arms and legs are high as you can and hold this position for ten seconds.” In addition, Schlacter (2008) also states that this method can improve the flexibility of the back as well as lessen the low back pain problem.

According to Johnson (2009), a specific exercise can be used to improve strength or flexibility in any part of the body and it will also help to strengthen the core of the body to hit longer and straight shots in golf.

The objective of this research was to determine the effects of shoulder flexibility on the golfers’ performance. The study was carried out to identify the effects of shoulder flexibility on the accuracy of iron-7 distance driving test. Thus, the scores and flexibility were determined so that a better performance in sports can be achieved.

**METHODS**

By using iron-7 while performing the distance driving test, the present study was done to investigate the accuracy of the subjects’ ability to score high long distance strokes. In this study, iron-7 was used because it is as a middle iron which is easy to handle by all golfers regardless of whether they are beginners or amateur players who have low handicap. In order to achieve this, the subjects must have a good golf swing of the shoulder movements as well as good shoulder flexibility. The subjects also need to possess other physical fitness components such as muscular strength, endurance and power to perform a massive powerful swing for golf. During the process, the subjects were requested to carry out proper warm up session before practice as it is particularly important in lengthening the muscles around the joint so that the golfers will be able to do proper rotation of their shoulders. This also helps them to develop a better progressive joint mobility to increase swing accuracy.

It has been stated that flexibility is very important for golfers, especially for the shoulders. Before the subjects started the test, they were briefed on the shoulder rotation test and golf distance driving test which would be measured for them. Then, subjects were required to start the test by doing some warming up exercises and stretching (Fig. 1). The purpose of doing the warm-up session was to increase
the body temperature, decrease the chance of muscle and joint injuries and lessen the chance of abnormal cardiac rhythms.

In this study, the samples or subjects comprised of 30 golfers aged between 20 to 40 years old. The research was done at Bukit Raja Golf Range in Klang, Selangor. Prior to the tests, all the subjects were informed of the risks and stress associated with the test. In addition, the researchers also gave a brief explanation on the purpose of the study to the subjects. Each of them was also asked to fill in a score sheet form before they performed the tests.

The subjects were given a consent letter which was collected on the testing day. A briefing session was conducted before the tests were carried out. The briefing covered and emphasized on the attire, the procedures during and the sequences of the tests. In order for the subjects to have a better understanding of the tests, both tests were demonstrated to them (Figs. 2 and 3). After that, the subjects were given 10 minutes to practice before the real tests were carried out. After the practice session had been completed, all the subjects were given three trials for each test to make them familiar and comfortable with the tests. Prior to the flexibility tests, the data on the golfers’ height, weight, and age were collected as the anthropometric data.
RESULTS
Table 1 shows the subjects’ demographics data which had been collected by the researcher. Through the data which are illustrated using the frequency analysis statistical method, the researchers were able to calculate the mean and standard deviation of the subjects’ demographics data. The average age of the golfers (N = 30) who participated in this study was 35.83 + year, with the height (m) of 1.71 + 0.04 meter and the average weight (kg) of 72.91 + 3.55 kg.

Meanwhile, the results presented in Table 2 indicate the significant differences between the golfers’ shoulder flexibility and their performance in golf. The significant level (p) was found to be < 0.005. As depicted in the table on distribution, r is equal to 0.000, indicating the strong relationship between shoulder flexibility and the golfers’ performance.

Nonetheless, Table 3 shows that there is no significant difference between shoulder flexibility and age factor, as the significant level is 0.739, the value which is higher than 0.005; this further indicates that the Null Hypothesis (Ho2) is accepted. The results prove that shoulder flexibility does not have a role in the golfers’ performance based on their age.

Table 4 shows that there are significant differences between the golfers’ performance and handicap factor. When the significant level is 0.000 and it is more than 0.005, it indicates that the Null Hypothesis (Ho3) is rejected. The results shows that the lower handicap golfers perform better in the tournament.

DISCUSSION
Based on the results presented above, it is clear that shoulder flexibility has a great effect on the golfers’ performance when playing golf. Apparently, flexibility is an important asset in the body fitness component of the joint movements. Most athletes who perform better in sports have high level of flexibility. Flexibility does not only lead to better performances, but more importantly, it reduces the chances of getting injury that usually occurs whether one is conscious or unconscious during sports. It has been proven by many researchers that high level of flexibility enhances most athletes’ achievement to achieve more vigorous excellent records.

Moreover, flexibility is an important component to help golfers maintain good joint mobility and increase resistance to muscle injury. It also helps in preventing lower-back and spinal problems that always occur to the golfers. By improving and maintaining good postural alignment, the golfers promote proper movements of the body and have a better range of motions (ROM) while striking or swinging the golf ball. In other words, the joint will be able to move smoothly without being injured or dislocated. By doing regular stretching and maintaining, specific stretching around the joint will also help to increase the development and to maintain basic motor skills of the golfers’ body movements.

In golf, flexibility of the shoulder movements is the most frequent part that has been used by the golfers. With good shoulder flexibility, the players will be able to use certain techniques of controlling the ball in better ways, such as the ability to perform continuous good swinging of the ball in a long drive to the fairway, as well as the accuracy in putting it into the hole, and the movement of scooping the golf ball out of the bunker area.

CONCLUSION
In conclusion, golfers’ performance in golf can be determined by their shoulder flexibility. In other words, the more flexible their shoulders are, the better their performance in golf will be. Nonetheless, shoulder flexibility is not affected by the age factor and that the golfers’ performance is also determined by their handicap. It is hoped that golfers will be able to achieve the physical activity goals, as well as attain and maintain the component level of their physical fitness to achieve a better performance. The findings of the current study have provided coaches and golfers with better information regarding performance and training methods. With a proper procedure and good techniques...
TABLE 1
Respondents’ background

<table>
<thead>
<tr>
<th>Variables</th>
<th>Frequency</th>
<th>Percentage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sex</td>
<td>Male</td>
<td>30</td>
</tr>
<tr>
<td></td>
<td>Female</td>
<td>0</td>
</tr>
<tr>
<td>Age</td>
<td>25-30</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td>31-35</td>
<td>11</td>
</tr>
<tr>
<td></td>
<td>36-40</td>
<td>13</td>
</tr>
<tr>
<td>Weight</td>
<td>61-70 Kg</td>
<td>11</td>
</tr>
<tr>
<td></td>
<td>71-80 Kg</td>
<td>19</td>
</tr>
<tr>
<td>Height</td>
<td>161-170 cm</td>
<td>14</td>
</tr>
<tr>
<td></td>
<td>171-180 cm</td>
<td>16</td>
</tr>
<tr>
<td>Handicap</td>
<td>0-11</td>
<td>9</td>
</tr>
<tr>
<td></td>
<td>12-18</td>
<td>11</td>
</tr>
<tr>
<td></td>
<td>19-24</td>
<td>10</td>
</tr>
</tbody>
</table>

Average age of the golfers (N = 30) is 35.83 ±.
Average height (m) of 1.71 ± 0.04 meter.
Average weight (kg) of 72.91 ± 3.55 kg.

TABLE 2
Correlation Pearson between golfers’ shoulder flexibility and golfers’ performance in golf

<table>
<thead>
<tr>
<th>Shoulder flexibility</th>
<th>Correlation Pearson</th>
<th>Sig. 1-tailed</th>
<th>N</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shoulder flexibility</td>
<td>.924</td>
<td>.000</td>
<td>30</td>
</tr>
<tr>
<td>Golfer performance</td>
<td>.924</td>
<td>.000</td>
<td>30</td>
</tr>
</tbody>
</table>

Correlation significant level, p < 0.005

TABLE 3
Mean difference for shoulder flexibility with age factor

<table>
<thead>
<tr>
<th>Variation</th>
<th>Ss</th>
<th>Df</th>
<th>Ms</th>
<th>F</th>
<th>Sig</th>
</tr>
</thead>
<tbody>
<tr>
<td>Between groups</td>
<td>.829</td>
<td>2</td>
<td>.415</td>
<td>.306</td>
<td>.739</td>
</tr>
<tr>
<td>In groups</td>
<td>36.638</td>
<td>27</td>
<td>1.357</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>37.467</td>
<td>29</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The significant level is p=0.005. For one-way ANOVA, the degree of freedom (df) is (N-1), so (30-1=29)
The Effects of Shoulder Flexibility on the Golfers’ Performance

TABLE 4
Mean difference for the golfers’ performance and handicap factor

<table>
<thead>
<tr>
<th>Variation</th>
<th>Ss</th>
<th>Df</th>
<th>Ms</th>
<th>F</th>
<th>Sig</th>
</tr>
</thead>
<tbody>
<tr>
<td>Between groups</td>
<td>18.073</td>
<td>2</td>
<td>9.036</td>
<td>34.232</td>
<td>.000</td>
</tr>
<tr>
<td>In groups</td>
<td>7.127</td>
<td>27</td>
<td>.264</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>25.200</td>
<td>29</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

From the table, the significant level is $p=0.005$. As for the one-way ANOVA, the degree of freedom (df) is (N-1), hence, 30-1=29

TABLE 5
Key points of the text

Key points
• This study examines the effectiveness of shoulder flexibility on the golfers’ performance.
• A randomized sampling was used to pick 30 golfers for this study.
• It is found that, there are strong relationships between shoulder flexibility and golfer performance, while shoulder flexibility did not play a role with age factor on golfers’ performance and that the lower handicap golfer perform better.
• We concluded that in order to increase performance level, golfers must monitor the flexibility component, total body conditioning, muscle strength, power and endurance. Apart from that, strong back core, shoulder flexibility, strength and proper posture will contribute to the golfer’s fitness to sustain in the long hour tournament.
• Based on the data of the present study, the subject should apply more specific stretching in order to get better flexibility.

In addition, more specific stretching should be focused in the upper extremities and upper limbs since they are the important body parts which are used the most in sports. Therefore, obtaining a better flexibility is also recommended. Table 5 gives a clearer view of the important points derived from this research.

Future researchers should look into the effects of using different clubs or irons (such as iron-3 and iron-4) to investigate the effects of shoulder flexibility on golfers’ performance because different clubs or irons may contribute to different results. Apart from that, future researchers should also compare between golfers’ performance while playing at the driving range and playing at the golf course, as the results may be different.

related to shoulder flexibility, it can create better training programmes. Besides, it can also minimize the degree of structural and functional asymmetry. All the information on physical fitness components is useful for the purpose of performance enhancement, particularly for the players who wish to increase their performance throughout the tournaments and prevent injury.

In the process of identifying the effectiveness of shoulder flexibility on golfers’ performance using iron-7 distance driving test, flexibility component, total body conditioning, muscle strength, power, and endurance have been found as the components which the golfers must monitor in order to increase their performance level. A good and proper strong back core, shoulder flexibility and strength, as well as proper postures, contribute to the golfers’ fitness to sustain in the long hour tournament.
ACKNOWLEDGEMENTS

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