PRE-COMPETITION ANXIETY LEVELS IN INDIVIDUAL AND TEAM SPORTS ATHLETES

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ABSTRACT

This present study investigated pre-competition anxiety by using both psychological and physiological measures of anxiety among individual and team sport athletes. Malaysian males back up athletes (N=52) participated in this study. Competitive State Anxiety Inventory (CSAI-2), heart rate and salivary samples were obtained from participants across three different times which at one week, one day and one hour prior to the competition. Trait anxiety was obtained once, at one week prior to the competition. Result of this study revealed that none of the variables except trait anxiety scores showed significant difference (p<.05) between individual and team sport athletes. In addition, there is a significant effect for time existed for heart rate level in team sports athletes which at one week and one hour prior to the competition. Meanwhile, in cortisol response, a significant effect for time was found in individual sports athletes only. The difference occurred at one week and one day prior to the competition. Future studies should use physiological measure and psychological measure at the same time prior a highly competitive situation in measuring anxiety on sport performance.

Field of Research: Cortisol, heart rate, individual athletes, state anxiety, team athletes.

1. Introduction

Competitive anxiety is one of the factors to decrease athletes' performance (Esfahani & Soflu., 2010). Feelings of tension, thinking of upcoming events in their mind, nervousness, worry and involved in physiological changes such as increased in heart rate response are common response for the athletes prior to the competition (Hackfort & Spielberger, 1989). Some athletes also involved with the feelings of fear, unhappiness, guilt, discouragement, and focus distraction (Cerin, 2003; Kais & Raudsepp, 2005). All of these conditions are a common conditions which is known as anxiety (Cerin, 2003; Hackfort & Spielberger, 1989; Jarvis, 2006; Kais & Raudsepp, 2005; Martens, Vealey, & Burton, 1990; Wiggins, 1998). However, Hanton et al., (2008) noted that athletes perform best when they are at the preferred...
anxiety level and how athletes interpret the anxiety situation, either anxiety can be facilitative or debilitating to performance.

Generally, there are two types of anxiety that are state anxiety and trait anxiety (Cox, 2002). State anxiety involved feeling of apprehension, tension, fear, and increase in physiological arousal (Cox, 2002). This is an immediate emotional state response to specific situation. State anxiety also consists of somatic and cognitive anxiety (Cox, 2002). Somatic anxiety is closely related to physiological aspects of anxiety which involved physical symptoms such as rapid heartbeat, shortness of breath and muscular tension (Cox, 2002; Leunes & Nation, 2002; Martens et al., 1990). Another component of state anxiety is cognitive anxiety which refers to worry and emotional distress for upcoming events (Martinent, Ferrand, Guillet, & Gautheur, 2010). Trait anxiety, which is involved with an experience of anxiety over a long period of time towards the stressful environments (Filaire, Sagnol, Ferrand, Maso, & Lac, 2001). It is also similar to a personality variable (Jarvis, 2006; Wann, 1997).

It has been found that, competing as individual or team sports moderate the anxiety levels when the competition approaches. Previous literatures reported that state anxiety were higher in individual sport compared to team sport participants (Craft, Magyar, Becker, & Feltz, 2003; Han et al., 2006; Martens et al., 1990; Martin & Hall, 1997; Simon & Martens, 1979; Zeng, 2003). However, self-confidence was found lower in individual than team sport athletes (Martens et al., 1990; Zeng, 2003). It seems that cognitive and somatic competitive anxiety is affected by social context of sport competition that is competing as individual versus team event (Martens et al., 1990; Martin & Hall, 1997).

Still, most of studies, often measured competitive anxiety using the self report inventory such as Competitive State Anxiety Inventory -2 (CSAI-2). Thus, physiological changes like hormones level and heart rate should be used in related above studies to better understand and verified the anxiety levels prior to the competition among individual and team sports athletes. One of the hormones, that is cortisol is release from adrenal cortex which from the hypothalamic pituitary adrenocorticol axis (HPAA) and released in response related to psychological state (Filaire, Alix, Ferrand, & Verger, 2009; Alix-Sy, Scanff and Filare, 2007) like anxiety (Chiodo et al., 2011). Recent studies showed, cortisol response was related with pre-competition anxiety (Filaire et al., 2009; Salvador, Suay, González-Bono, & Serrano, 2003). According to Filaire et al., (2009) a significant positive relationship also was found between cortisol and both somatic and cognitive anxiety in competition. This shows that when psychological measure like cognitive anxiety was affected, cortisol hormones also affected at the same time. There are two methods can be used to measure cortisol hormones that are using blood samples or salivary samples. However, sample of saliva is the best method because it is proven to measure the cortisol response as a non-invasive method and easier to researcher for data collection (Kim et al., 2010; Gatti & De Polo, 2010; McKay, Selig, Carlson, & Morris, 1997). Cortisol was found increases prior to competition in individual sports (Filaire et al., 2001; Filaire et al., 2009; Kim Kwang-Jun et al., 2010; Luopos et al., 2008; Mckay, 1998; Salvador et al., 2003) as well in team sports (Haneishi et al., 2007). Yet, it seems that researchers have investigated the sports separately without looking into the potential differences of salivary cortisol response between the sport categories. So, regarding a lack of studies on salivary cortisol response among individual and team sport athletes, which may give a good marker in understanding of anxiety levels, this study, therefore, will examine both psychological and physiological measures of anxiety levels prior to the competition.
2. Methodology

2.1 Participants

Fifty-two (N=52) Malaysian back up athletes were participated voluntarily in this present study. Malaysian back up athletes is defined as Malaysian's best young athletes that are selected to ensure the country always has athletes to support the existing elite athletes. These comprised of males’ athletes whose aged ranging from 16 to 23 years old. There were divided into two groups that are individual sport athletes and team sport athletes. Individual sports comprised of athletes from squash, table tennis, lawn ball, bowling and track and field athletes. Team sport comprised of athletes from volleyball, cricket and petanque.

2.2 Instrumentation

Psychological measures: State-Trait Anxiety Inventory (STAI) questionnaire has utilized to measure trait anxiety. This inventory was developed by Spielberger, Gorsuch & Lushene, (1970) which consisted of two subscales that measure state and trait anxiety. Each subscale consists of 20 items and rated on a 4-point Likert scale of 1 (almost never) to 4 (almost always). The scores ranging from 20 to 80 for each subscale. However, for this study, only the trait scale was used to measure the trait anxiety level. Competitive State Anxiety Inventory-2 (CSAI-2) that developed by Martens et al., (1990) was used to measure pre-competition cognitive anxiety, somatic anxiety, and self-confidence of the participants. The CSAI-2 has 27 items, with nine items in each subscale and arranged in a 4-point Likert scale format. The response scale requires the participants to rate the intensity of each symptom on a scale of 1 (not at all) to 4 (very much), so resulting in scores ranging from 9 to 36 for each subscale.

Physiological measures: To measure heart rate, polar heart rate (RS100) was used. Additionally, salivary cortisol response was determined using the Salimetrics Salivary Cortisol Enzymes Immunoassay Kits.

2.3 Procedures

Participants were briefly explained on the purpose of present study and all procedures involved in the study. Present study was approved by UiTM research ethical committee. Informed consent form was obtained from participants at one week prior to the competition to waive any accidental occurs during the test that does not related with the test procedures. At the same day, participants also required to answer the STAI questionnaire.

Then, CSAI-2 questionnaire was later administered to the participants and were collected after participants finished answering the questionnaire. The standardized instructions were used to administer the CSAI-2 questionnaire, which were anti-social desirability instructions as suggested by Marten et al. (1990). Physiological measures of anxiety were conducted immediately after participants returned the questionnaire. Heart rates of participants were recorded and saliva samples were collected. CSAI-2, heart rate and saliva samples collection procedure were repeated in the same manner for one day and one hour prior to the competition. All the measurements were obtained before the beginning of any warm up activity in order to minimize any effect of exercise or physical activity on cortisol levels (Salvador et al., 2003).
For the heart rate measure, participants were asked to wear polar heart rate, sit quietly and recorded for one minute. For the collection of saliva, participants were advised not to take any food or drinks for 30 minutes prior and no brushing teeth two hours before collection session. Besides, participants were not allowed taking alcohol the night before or the day of saliva collection. All of these guidelines (Salimetrics, 2010; Gatti & De Palo, 2010) were given to participants at the first meeting and were reminded to participants at pre-saliva collection day. On the day of collection, participants also were asked to rinse their mouth with water before accumulate the saliva (Filaire et al., 2007) to avoid any contamination in their mouth. Participants were asked to tilt their head forward and spit their saliva directly into the plastic tubes (Salvador, 2003; Filaire et al., 1999). All the samples were labelled and were sent to laboratory to analyse using Salimetrics Salivary Cortisol Enzymes Immunoassay Kit.

3. Finding & Discussion

3.1 Results

Means and standard deviation of the variables examined in the present study are presented in the Table 1. The results of the data showed that the mean of cognitive anxiety and somatic anxiety scores at three different times (one week, one day and one hour prior to the competition) were higher in individual sports athletes compared to team sports athletes. But, the mean of self-confidence scores at one week and one day prior to the competition were higher in team sports compared to individual sports. On the other hand, only the mean of self-confidence scores at one hour prior to the competition were higher in individual sports compared to team sports. In addition, the mean of heart rate level at one week prior to the competition were higher in individual sports compared to team sports. The mean of heart rate level at one day and one hour prior to the competition were higher in team sports compared to individual sports. In term of cortisol response, the result demonstrated that the mean of cortisol response at one week, one day and one hour prior to the competition were higher in team sports compared to individual sports.

To test if there is a significant difference between individual and team sport athletes in physiological and psychological measure of anxiety across the three different times (one week, one day and one hour) prior to the competition, mixed between-within subjects’ analysis of variance was performed. The results revealed that, none of the variables showed significant difference between individual and team sport athletes. However, Independent samples t- Test was utilized to compare trait anxiety between individual and team sport athletes. A significant difference was found in trait anxiety scores between individual (M=44.35, SD=3.90) and team sport athletes, (M=41.54, SD=5.47); t (50) =2.13, p<0.05 (Table 2). The result indicated that higher trait anxiety scores was found in individual sports then team sports athletes.
Table 1: Mean and standard deviation (SD) of variables examined in individual and team sports athletes

<table>
<thead>
<tr>
<th>Variables</th>
<th>One week before</th>
<th>One day before</th>
<th>One hour before</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean</td>
<td>SD</td>
<td>Mean</td>
</tr>
<tr>
<td>Individual Sports</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cognitive</td>
<td>20.92</td>
<td>6.33</td>
<td>21.65</td>
</tr>
<tr>
<td>Somatic</td>
<td>17.08</td>
<td>4.24</td>
<td>17.65</td>
</tr>
<tr>
<td>Self-confidence</td>
<td>26.04</td>
<td>4.60</td>
<td>25.73</td>
</tr>
<tr>
<td>Heart rate</td>
<td>82.08</td>
<td>11.46</td>
<td>81.96</td>
</tr>
<tr>
<td>Cortisol</td>
<td>0.132</td>
<td>0.066</td>
<td>0.101</td>
</tr>
<tr>
<td>Team Sports</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cognitive</td>
<td>18.92</td>
<td>5.15</td>
<td>19.73</td>
</tr>
<tr>
<td>Somatic</td>
<td>15.65</td>
<td>4.58</td>
<td>17.38</td>
</tr>
<tr>
<td>Self-confidence</td>
<td>26.73</td>
<td>5.23</td>
<td>25.81</td>
</tr>
<tr>
<td>Heart rate</td>
<td>80.27</td>
<td>10.11</td>
<td>82.19</td>
</tr>
<tr>
<td>Cortisol</td>
<td>0.170</td>
<td>0.094</td>
<td>0.120</td>
</tr>
</tbody>
</table>

Table 2: Trait anxiety scores between individual and team sport athletes

<table>
<thead>
<tr>
<th>Variables</th>
<th>Individual sport</th>
<th>Team sport</th>
<th>t-value</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Trait anxiety</td>
<td>Mean</td>
<td>SD</td>
<td>Mean</td>
<td>SD</td>
</tr>
<tr>
<td></td>
<td>44.35</td>
<td>3.90</td>
<td>41.54</td>
<td>5.47</td>
</tr>
</tbody>
</table>

*Significant level (p<.05)

In addition, in order to investigate if there is a significant difference in physiological measures of anxiety across the three different times prior to the competition within each sport categories, one way repeated measure ANOVA was used. The assumption of sphericity was violated in some cases; therefore Green-House Geisser correction was reported. The result showed that there is no significant effect of time for heart rate level existed in individual sports athletes, Wilk’s Lambda = .99, F (2, 24) = 0.10, p>0.05. Meanwhile, there is a significant effect of time for heart rate level existed in team sports, Wilk’s Lambda = .70, F (2, 24) = 5.05, p<0.05. Bonferroni pairwise comparisons further verified that there is a significant difference at one week (M=80.27) and one hour (M=87.38) prior to the competition. Whereas in cortisol response, there is a significant effect for time, Wilk’s Lambda = .77, F (1.43, 35.79) = 1.60, p<0.05 in individual sports athletes. Bonferroni pairwise comparisons further verified that there is a significant difference in one week (M=0.132) and one day (M=0.101) in individual sports. A significant higher of cortisol response was found at one week compared to one day prior to the competition. Meanwhile, there is no significant effect of time existed was found in team sports, Wilk’s Lambda = .92, F (2, 24) = 1.07, p>0.05. The changes of pre-competition cortisol response can be seen in Figure 1.
3.2 Discussion

This study highlighted the anxiety levels by utilizing both psychological and physiological measures of anxiety as the competition approached among individual and team sports athletes. The mean and standard deviation for cognitive anxiety and somatic anxiety scores shown higher in individual sport compared to team sport athletes. However, the results are not statistically significant difference between individual and team sport athletes. These results in lined with previous meta-analysis study by authors, Woodman & Hardy, (2003) who reported that no significant differences between individual and team sport for cognitive anxiety and somatic anxiety scores. However, the results not supported the previous studies which reported that cognitive and somatic anxiety scores prior to competition was statistically significant difference between individual and team sports athletes with cognitive and somatic anxiety were found greater in individual sport compared to team sport athletes (Han et al., 2006; Marten et al.1990; Martin & Hall, 1997; Zeng, 2003). The difference findings could be at least partially attributed with the used of different type of sports. Most of previous literatures have not control the factor of contact and non-contact, as well as subjective and objective sport as in this present study.

In addition, even though the mean of heart rate level and cortisol response seemed to slightly difference between individual and team sport athletes across the three different times, the result also found to be not statistically significant difference between individual and team sport athletes. The results indicated that both sport categories showing no significant changes of physiological measures across three different times. However, physiological measures of anxiety levels seemed to be higher in team sports athletes compared to individual sports athletes.

A significant difference in trait anxiety scores between individual and team sport athletes also found in this study. Individual sport athletes demonstrated a significant higher in trait anxiety scores compared to team sport athletes. The result in lined with previous study who did found similar results (Han et al., 2006; Marten.,1990). The findings of this present study, however, were contradicting disagreed with the findings of Zeng, (2003) which indicated that no significant differences was exists in trait anxiety scores between individual and team sport athletes. The author stated that the trait anxiety scores between
individual and team sport in their study seemed to be similar. The different time used for measuring the trait anxiety may partially contribute to the contradicting findings.

Also, no significant effect of time for heart rate level was found in individual sports athletes, mean while, a significant effect of time for heart rate level existed in team sports only. A significant higher of heart rate level was found at one hour compared to one week prior to the competition. The result from this study supported the study by Luopos et al., (2008) which reported a significant increase in heart rate prior to competition. Cottyn et al., (2006) and Robazza et al., (1999) also indicated a significant increase in heart rate during the competition session compared to training sessions.

Whereas in cortisol response, the result revealed that there is a significant effect for time in individual sports athletes. Partial accordance with findings by Chiodo et al., (2011) and Fillaire et al., (2007) who reported a significant different of cortisol response prior to the competition compared to resting day. However, Fillaire and colleagues studied elite male paragliders and claimed that cortisol response is higher when nearer to the competition compared to resting day. Agreed by Chiodo and colleagues who reported salivary cortisol was significantly higher before the competition than at rest. However, surprisingly, in present study cortisol reponse at one week prior to the competition was found significantly higher than one day prior to the competition. However, the mean difference is slightly small. Thus, even though the previous research above found significant difference between resting and competition, the mean of cortisol response was found difference in the present study which is higher at one week compared to closed to competition that is one day prior to competition. A possible explanation is the different temporal used in investigating cortisol response prior to the competition. For instance, Eubank et al., (1997) also found significant increases in cortisol response in their study, but cortisol was found significantly elevated at two hours to one hour prior to competition, which differed from present study. Also, the contrasts findings might be affected by the used of type of sports in the previous studies. It also can be explained with different of energy systems that required by the sport itself had influenced on salivary cortisol changes (Fillaire et al., (1999).

Mean while, there is no significant effect of time existed was found in team sports athletes although cortisol response demonstrated a slightly different for each of three times of measurement. Present result was in line with previous authors of Moreira et al., (2007). Even though they found a continuous increase of cortisol in players but it is not statistically significant difference. Besides, there are no significant changes of times for cortisol response in hockey players also reported by Thatcher et al., (2004). However, this finding is in contrary to the findings of Alix-Sy et al., (2008) that reported a change of cortisol response which is increasing response from baseline value to nearer the competition with all players shows the same result. However, soccer can be classified as contact sport which may partially contribute to the different findings with current study. In addition, high level of both aerobic and anaerobic abilities as physiological demands that required by soccer contribute to the greater hormonal response to the competition compared to other sports (Alix-Sy et al., 2008).

Study by Eubank et al., (1997) reported that cortisol response was elevated in the group of canoeist who interpret anxiety as debilitative prior to the competition. The authors also indicated that, athletes demonstrated stable and low levels of cortisol response if they interpret anxiety as facilitative towards their performance. Sanchez et al., (2010) also indicated that, high anxiety was benefit to performance and it is proven associated to performance. From the result of present study, it can be speculate that,
even though individual sport athletes experienced higher state and trait anxiety scores, they might interpret the anxiety as facilitative and adequate. Besides, Thacher and colleagues also claimed that as cognitive anxiety and somatic anxiety increases, the level of hormonal response decreased. Even though their study investigated hormonal response using adrenaline and nor adrenaline, from the study it is suggests that, it is possible that cortisol response as hormonal response can demonstrate the decreased response too.

4. Conclusion and Future Recommendation

Although the findings showed no significant difference of cognitive anxiety, somatic anxiety, self-confidence scores, heart rate levels and cortisol response between individual and team sports athletes, more detail investigation is recommended to seek and better clarify other physiological measures similar to this study. The findings of this study also limited only to single status event which is the result of anxiety levels may varied in different competition. It is recommended that, sport type classification need to properly identify in order to avoid any complexity regarding to anxiety and sport performance. Other criteria should be look into in determining and measuring anxiety for type of sport, such as the intensity of the sport itself. It would be advisable to measure anxiety prior or closer to the final of the competition which might produce higher level of anxiety.

References


