DOES PRE-POST GAME ANXIETY LEVELS AND VISUAL MEMORY CHANGES FOR CHESS PLAYERS?

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**SUMMARY**

Chess is an educational mind sport that requires different types of items, rules, but based on creative intelligence. Improvement of cognitive function can lead to improvement of performances and quality. The aim of this study was to investigate state-trait anxiety levels and visual memory scores before/after the game and whether if there is a change, and is this related to gender. Twenty elite chess athletes (10 male, 10 female) who were participating in Turkish Cup, aged between 18-30 enrolled into the study, voluntarily. Demographic datas were recorded. Athletes were tested randomly, 30 minutes earlier than the game and 60 minutes later the game. State-Trait Anxiety Inventory and Benton Visual Retention Test F form were done.

Athletes’ ages are 24 ± 8.1 years old; heights’ are 173.2 ± 9.1 cm; body weights’ are 66.6 ± 22.7 kg; and they are participating chess sports for 12.6 ± 4.1 years. There is no demographical difference found between groups when they are divided into groups via gender (p˃0.05). There was no statistically significant differences found between pre- and post- game scores (p˃0.05). When gender factors were evaluated, it was found that female athletes have higher pregame and postgame Benton Visual Retention Test and anxiety scores. However those results were not statistically significant between female and male groups (p˃0.05). Male and female athletes’ pre- and post-game results showed no statistically significant differences (p˃0.05).

To a level, anxiety levels have beneficial effects for athletes. Important thing for is to determine the anxiety levels which starts athletes to perform badly. This level should be determined individually and must be controlled via behavior therapy, if needed medically. We think that trainings that will be done under anxious situations or different type programme will improve athletes performances.

**KEYWORDS**: Chess; anxiety; visual memory.

**INTRODUCTION**

Chess is an educational mind sport that requires different types of items, rules, but based on creative intelligence. There are archaeological evidence that chess was played 4000 years earlier today in Egypt (Köksal, 2006). Various researchers have shown that, playing chess enhances cognitive functions, problem solving, acting flexible and improves short term memory and visual memory. Improving the cognitive functions may improve performance and ability of the athletes. Especially for olympic athletes, it is known that these athletes are doing cognitive trainings for anxiety during games/sportive events, in addition to physical trainings (Garland and Barry, 1991).

Athletes who are participating competitions at different levels face stress factors. Especially athletes who are between 13-24 years old point out that they have an anxiety during games/competitions but not their daily activities. Anxiety related to some level can be accepted as normal. However, athletes who have high level anxiety which affects athletes performance will need Professional help (Coombes et al, 2009).

Anxiety symptoms which were observed at athletes, were not able to diagnose at specific anxiety disorder according to DSM-IV. Sport related anxiety can be defined as ‘the tendency to respond as anxiety and tension due to taking competition as a threat’. Subtypes for sport related performance anxiety are; state anxiety, trait anxiety, somatic anxiety, cognitive anxiety, behavioral anxiety, performance anxiety, facilitating anxiety, weakening anxiety, pre-during-post game/competition anxiety (Coombes et al, 2009).

So many studies were done to investigate to effects of anxiety on sportive performance of athletes. The most known theory is ‘Inverted U Theory’. According to this theory, anxiety to some levels have beneficial effects of performance of the athletes. To get maximum beneficial effect, optimal anxious situations are needed. However anxiety more than that level will begin to harm the athlete, and affects athletes physical, motor and cognitive functions adversely (Coombes et al, 2009).

The aim of this study was to investigate state-trait anxiety levels and visual memory scores before/after the game and whether there is a change, is this related to gender at chess athletes.

**MATERIAL AND METHOD**

Twenty elite chess players, who has played Turkish Chess Championship, were enrolled into the study (10 women,10 men). Prior to the study, all participants were informed about all kinds of benefits and risks of the study. The study was conducted in accordance with the “Declaration of Helsinki”.

State-Trait Anxiety Inventory tests (STAI) and Benton Visual Retention Test F form (BVRT) were done 30 minutes prior to games and 60 minutes after the games (Başbuğ, 2009; Potvin et al, 2013).

***State-Trait Anxiety Inventory tests***

STAI was constructed by Spielberger et.al. at 1970, to determine the anxiety levels for subjects who were older than 14 years old. Turkish validity and reliability were provided in 1983. Answers that can be given for State Anxiety Inventory are (1) not at all, (2) somewhat, (3) moderate and (4) very much so. Answers that can be given for Trait Anxiety Inventory are (1) almost never, (2) sometimes, (3) often, (4) almost always. There are two kinds of expressions in scales, directly and reversely. Direct expressions show negative emotions and reverse expressions show positive feelings. During evaluation results for the latter expressions, 1 point results evaluated as 4 points and 4 point results were evaluated as 1 point. 4 point results for direct expressions show high anxiety. One point results for reverse expression shows high anxiety, whereas 4 point results show low anxiety for reverse expression. State anxiety inventory test consists of 10 reverse expression. Those are 1st, 2nd, 5th, 8th, 10th, 11th, 15th, 16th, 19th and 20th questions. Trait anxiety inventory test consists of 7 reverse expressions. Those are 21st, 26th, 27th, 30th, 33rd, 36th and 39th questions. Reverse expressions’ total weighted points are subtracted from direct expressions’ total weighted points. These results are summed with 50 value for State Anxiety Inventory, and summed with Trait Anxiety Inventory for 35 value. Those are the results are patients’ anxiety points. Results of the questionnaire are change between 20 to 80 points. 36 point under this shows that there is no anxiety, 37 to 42 shows slight anxiety and 43 and more show high anxiety. Subjects whose results’ 60 or more than 60 need professional help and medical treatment (Çetinkaya et al, 2008).

***Benton Visual Retention Test***

BVRT is an individually administered test for people who were 8 years old or older. The test was found to be reliable in normal population. The test has been designed forms (C, D and E form) and Choose forms (F and G). BVRT F form used in our study.

Performer told participants that ‘I am going to show you some cards that contains one or more figures. And after this I am going to show you 4 figures. I want you to find the same of the 1st figure showed. 1st card and figure showed to the subject for 10 seconds. Then subject was asked to find the same figure at next card. Fifteen cards were shown to subject and wanted from him to find same figures.

Participants’ answers were noted and controlled. Fourteen-15 point is high level, 12-13 point is good level, 11 point is medium, 10 point is low medium and 9 point shows visual memory at border (Amieva et al, 2006).

**Statistical Analysis**

All data were analyzed SPSSv22.0 package program. Descriptive statistical method was used to identify data. Kurtosis Skewness test is used to determine the normality of the data distribution. The Wilcoxon Signed Rank test was used to detect intra-group difference, and the Mann Whitney-U test was used to detect differences between groups. Statistical significance was taken as p<0.05. The results were given as median ± standard error.

**RESULTS**

Twenty subjects (10 male, 10 female) enrolled into the study. Subjects’ ages are 24 ± 8.1 years old, heights’ are 173.2 ± 9.1 cm, body weights’ are 66.6 ± 22.7 kg, and they are participating chess sports for 12.6 ± 4.1 years. There is no demographical difference found between groups when they are divided into groups via gender (Table 1), (p˃0.05).

**Table 1.** Demographic data (Median ± Standard Error)

|  |  |  |  |
| --- | --- | --- | --- |
|  | **Male (n=10)** | **Female (n=10)** | ***p value \**** |
| **Age (year)** | 27.4 ± 10 | 19.8 ± 1.7 | *0.19* |
| **Height (cm)** | 177 ± 10 | 168.5 ± 5.8 | *0.11* |
| **Body weight (kg)** | 78.6 ± 24.5 | 51.5 ± 5.3 | *0.06* |
| **Sportive History (years)** | 14.6 ± 4.4 | 10 ± 1.6 | *0.11* |

\*: Mann Whitney-U test.

State anxiety inventory points were 47.9±15.8, trait anxiety inventory points were 44.6±7.4, BVRT points were 13.2±1.8 for 30 minutes prior to games. Same tests were done 60 minutes after the games. State anxiety inventory points were 41.4±16.3, trait anxiety inventory points were 42.8±9.6, BVRT points were 14.6±0.5 after the games. There were no statistically significant differences found between pre and post-game scores (p˃0.05). When gender factors were evaluated, it was found that female athletes have higher pre-game and post-game BRVT and anxiety scores. However those results were not statistically significant between female and male groups (Table 2), (p˃0.05).

**Table 2**. Pre and Post-game visual memory and anxiety results (Median ± Standard Error)

|  |  |  |  |
| --- | --- | --- | --- |
|  | **Pre-game** | **Post-game** | ***p value \*\**** |
| **Benton Visual Retention Test Scores** | | | |
| All participation (n=20) | 13.2±1.8 | 14.6±0.5 | *0.26* |
| Male (n=10) | 12.8 ± 2.6 | 14.3 ± 0.6 | *0.32* |
| Female (n=10) | 13.8 ± 0.5 | 14.8 ± 0.5 | *0.10* |
| ***p value \**** | *1.0* | *0.4* |  |
| **State Anxiety Inventory Scores** | | | |
| All participation (n=20) | 47.9±15.8 | 41.4±16.3 | *0.29* |
| Male (n=10) | 39.3 ± 11.4 | 36.5 ± 12.5 | *1.0* |
| Female (n=10) | 56.5 ± 16 | 46.3 ± 20 | *0.14* |
| ***p value \**** | *0.11* | *1.0* |  |
| **Trait Anxiety Inventory Scores** | | | |
| All participation (n=20) | 44.6±7.4 | 42.8±9.6 | *0.39* |
| Male (n=10) | 40 ± 7.1 | 37.3 ± 9.7 | *0.19* |
| Female (n=10) | 49.3 ± 4.5 | 48.3 ± 6.5 | *1.0* |
| ***p value \**** | *0.11* | *0.11* |  |

\*: Mann Whitney-U test, \*\*: Wilcoxon Signed Rank Test.

**DISCUSSION**

As a result of our study, pre and post-game anxiety scores’ and BRVT scores’ for chess athletes showed no differences. Additionally those results showed no differences according to gender too.

In the literaure, pre- and post-game anxiety scores are evaluated many times. However this was not done for chess athletes earlier. Hacicaferoglu et.al. investigated anxiety levels for Turkish Folk Dance competition athletes. In that study, female athletes, younger athletes and athletes who starts to participate competition later than other athletes’ anxiety levels were found higher (2015). Dönmez’s study for basketball players showed both state and trait anxiety inventory scores were higher for female athletes than male athletes. And this was found related to licensed years of sportive participation. 0-3 years licensed players anxiety levels were higher than 8-11 year licensed and more than 12 years licensed players (2013). Başaran et. al. Found no differences between female and male athletes for train anxiety scores, however state anxiety scores were more higher for male athletes than female athletes. State and trait anxiety scores differs with sports branch and history of participation, and this was also found related to state and trait anxiety levels (2009).

Civan et. al. showed that state anxiety levels were more higher for athletes who were participating individually than participating for teams, but this was not related with age and gender (2010). Karabulut et.al. showed that anxiety levels for 13-15 years old male football players were high. This was related to some factors like high educated father. However age of the athlete and history of sport participation was not found to be related with trait anxiety level (2013). Bingöl et.al. found no relation between gender, age, sport participation history and which university they were educating (2012). Erbaş et.al. showed no relation of state anxiety levels with age, sport participation history, staying in game times and status of the elite male basketball players (2012).

Elite wrestling athletes’ state anxiety scores more higher before weighing than after the weighing. This was thought related to be with athletes aim to reach his weight category or not (Tazegül, 2016). Çoksevim et.al. showed state-trait anxiety inventory scores and Brief Symptom Inventory Severity Index scores were higher before the game evaluation than after the game evaluations. This study found this related with excitement, pride, high concentration, wanting to be champion increases the mental performances of the athletes (2008). Cerit et.al. claimed that having higher pre-game higher anxiety scores for elite basketball women player have positive effects on in game performance (2013).

In literature there were limited studies to investigate effects of anxiety on athletes cognitive functions. Hadwin et.al. showed no differences for high and low levels anxiety leveled children have no differences at basic cognitive functions, however high anxiety level children did their busy in a longer time (2005). Lapointe et.al., showed that anxiety level affects short term memory and attention of the 18-65 years old participants, and found that this was the results of anxiety on cognitive functions (2013). Potvin et.al. patients with our dementia over 66 years old, low or medium anxiety levels improved verbal functions and general cognitive functions. Medium or high anxiety levels improved short term visual memory for lower educated patients. (2013). Mutchnick et.al. showed that anxiety scores were higher for who have cardio pulmoner by-pass operation at younger ages. However this was not showed any relation with cognitive function (2012).

Niewenhuys showed that shooting performances were lower under anxiety, however 4 month shooting exercises under anxious situation improved the visual care and cognitive performances (2011). Oudejans and Pijpers, dart athletes who were exercising under low anxiety levels had preserved their motor functions at high anxiety levels (2010). Yurdakul et.al. showed good visual memory and attention for 12 weeks movement educated 8 years old children (2012).

**CONCLUSION**

To a level, anxiety levels have beneficial effects for athletes. Important thing for is to determine the anxiety levels which starts athletes to perform badly. This level should be determined individually and must be controlled via behavior therapy, if needed medically.

In chess, visual memory is needed like cognitive functions for success. For this reason, trainings that will be done under anxious situations will improve athletes performances.

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**References**

Amieva, H., Gaestel, Y., Dartigues, J.F. (2006). The multiple-choice formats (forms F and G) of the Benton Visual Retention Test as a tool to detect age-related memory changes in population-based studies and clinical settings. *Nature Protocols*, *1*(4), 1936-1938.

Başaran, H.M., Taşğın, Ö., Sanioğlu, A, Taşkın, K.E. (2009). Examination of the level of state-trial anxiety of sportsmen according to some variables. *Selçuk Universıty Journal of Social Science*, *21*, 534-542.

Baştuğ, G. (2009). Bayan voleybolcuların müsabaka dönemi kaygı ve umutsuzluk düzeylerinin incelenmesi. *Selçuk Üniversitesi Beden Eğitimi ve Spor Bilim Dergisi*, *11*(3), 15-20.

Bingöl, H., Çoban, B., Bingöl, Ş., Gündoğdu, C. (2012). Üniversitelerde öğrenim gören taekwondo milli takım sporcularının maç öncesi kaygı düzeylerinin belirlenmesi. Selçuk Üniversitesi. *Beden Eğitimi ve Spor Bilimleri Dergisi*, *14*(1), 121-125.

Cerit, E., Gümüşdağ, H., Evli, F., Şahin, S., Bastık, C. (2013). Elit kadın basketbol oyuncularının yarışma öncesi kaygı düzeyleri ile performansları arasındaki ilişki. *Sport Sciences*, *8*(1), 26-34.

Civan, A., Arı, R., Görücü, A., Özdemir, M. (2010). Bireysel ve takım sporcularının müsabaka öncesi ve sonrası durumluk ve sürekli kaygı düzeylerinin karşılaştırılması. *Uluslararası İnsan Bilimleri Dergisi*, *7*(1), 193-206.

Coombes, S.A., Higgins, T., Gamble, K.M., Cauraugh, J.H., Janelle, C.M. (2009). Attentional control theory: Anxiety, emotion, and motor planning. *Journal of Anxiety Disorders*, *23*(8), 1072-1079.

Çetinkaya, S., Nur, N., Ayvaz, A., Ozdemir, D. (2008). Depression, anxiety levels and coping strategies with stress in continuous ambulatory peritoneal dialysis (CAPD) and hemodialysis (HD) patients in a university hospital. *Archives of Neuropsychiatry*, *45*(3), 78-85.

Çoksevim, B., Sarıtaş, N.N., Kaya, M., Pepe, O. (2008). Kikbokscularda maç öncesi ve sonrası durumluluk, süreklilik, kısa semptom envanteri bulguları. *Türkiye Kikboks Federasyonu Spor Bilimleri Dergisi*, *1*, 22-27.

Dönmez, K.H. (2013). Samsun ilinde yapılan üniversitelerarası basketbol müsabakalarına katılan sporcuların durumluk kaygı ve sürekli kaygı düzeylerinin incelenmesi. *The Journal of Academic Social Science Studies*, 6(5), 243-248.

Erbaş, M.K., Küçük, V. (2012). Üst düzey basketbolcularda durumluk kaygı düzeylerinin farklı değişkenlere göre karşılaştırılması. Selçuk Üniversitesi. *Beden Eğitimi ve Spor Bilimleri Dergisi*, 14 (2), 257-261.

Garland, D.J., Barry, J.R. (1991). Cognitive advantage in sport: The nature of perceptual structures. *The American Journal of Psychology*, 211-228.

Hacıcaferoğlu, S., Hacıcaferoğlu, B., Seçer, M. (2015). Halk oyunları branşına katılan sporcuların yarışma öncesi kaygı düzeylerinin bazı değişkenler açısından incelenmesi. *International Journal of Science Culture and Sport (IntJSCS)*, *3*(4), 288-297.

Hadwin, J.A., Brogan, J., Stevenson, J. (2005). State anxiety and working memory in children: A test of processing efficiency theory. *Educational Psychology*, *25*(4), 379-393.

Karabulut, E.O., Atasoy, M., Kaya, K., Karabulut, A. (2013). 13-15 yaş arası erkek futbolcuların durumluk ve sürekli kaygı düzeylerinin farklı değişkenler bakımından incelenmesi. *Ahi Evran Üniversitesi Kırşehir Eğitim Fakültesi Dergisi*, *14*(1).

Köksal, A. (2006). Eğitimde satranç. *Mehmet Akif Ersoy Üniversitesi Eğitim Fakültesi Dergisi*, 17-27.

Lapointe, M.L.B., Blanchette, I., Duclos, M., Langlois, F., Provencher, M.D., Tremblay, S. (2013). Attentional bias, distractibility and short-term memory in anxiety. *Anxiety, Stress & Coping*, *26*(3), 293-313.

Mutchnick, M.G., Williams, J.M. (2012). Anxiety and memory test performance. *Applied Neuropsychology: Adult*, *19*(4), 241-248.

Nieuwenhuys, A., Oudejans, R.R. (2011). Training with anxiety: short-and long-term effects on police officers’ shooting behavior underpressure. *Cognitive Processing*, *12*(3), 277-288.

Oudejans, R.R., Pijpers, J.R. (2010). Training with mild anxiety may prevent choking under higher levels of anxiety. *Psychology of Sport and Exercise*, *11*(1), 44-50.

Potvin, O., Bergua, V., Meillon, C., Le Goff, M., Bouisson, J., Dartigues, J.F., Amieva, H. (2013). State anxiety and cognitive functioning in older adults. *The American Journal of Geriatric Psychiatry*, *21*(9), 915-924.

Tazegül, Ü. (2016). To compare elite wrestlers' state of anxiety before-after weighing. *Journal of Academic Social Science Studies*, (46), 373-377.

Yurdakul, N.A., Çamlıyer, H., Çamlıyer, H., Karabulut, N., Soytürk, M. (2012). Sekiz yaş grubu çocuklarda hareket eğitiminin dikkat ve hafıza gelişimine etkileri. Selçuk Üniversitesi. *Beden Eğitimi ve Spor Bilimleri Dergisi*, *14*(1), 103-108.