ORİJİNAL ARAŞTIRMA ORIGINAL RESEARCH

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A Comparison of Body Awareness Level and Fatigue Severity of Adolescent Athletes and Sedentary Individuals

Vücut Farkındalık Düzeyi ve Yorgunluk Şiddetinin Adölesan Sporcu ve Sedanter Bireylerde Karşılaştırılması

Murat EMİRZEOĞLU[a],
Arzu ERDEN[a]

[a]Department of Physiotherapy and Rehabilitation,
Karadeniz Technical University
Faculty of Health Science,
Trabzon, TURKEY

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Correspondence:
Murat EMİRZEOĞLU
Karadeniz Technical University
Faculty of Health Science,
Department of Physiotherapy and Rehabilitation, Trabzon,
TURKEY/TÜRKİYE
muratemirzeoglu@gmail.com

This study abstract was presented as oral presentation at the 4th Internatiol Health and Sports Science Symposium in Alanya, Turkey on May 4, 2018.

ABSTRACT Objective: The aim of the study was to compare the body awareness and fatigue severity of adolescent athletes and sedentary individuals. **Material and Methods:** The study was performed with 81 athletes (22 females, 59 males) licenced in 13 different sports (football, basketball, swimming, handball, wrestling, boxing, athletics, volleyball, karate, badminton, sailing, taekwando, judo) and 81 (37 females, 44 males) age-matched sedentary individuals. Sociodemographic data were recorded. The Body Awareness Questionnaire (BAQ) and the Fatigue Severity Scale were completed by both groups and the data were compared. **Results:** The mean age of participants was 15.27±1.23 years, mean body mass index was 21.20±2.82 in athletes, and 20.74±2.55 in sedentary individuals. No difference was determined between the athletes and the sedentary group in respect of the BAQ total score. The Changes in the Body Process and Attention to Responses (BAQ-1) scores from the BAQ subscales were better in the sedentary group than in the athletes. The fatigue severity of athletes was lower than in the sedentary group. No correlation was determined between fatigue and body awareness in either group. **Conclusion:** The results of this study showed that body awareness may be higher in sedentary adolescents and fatigue intensity may be less felt in athletes.

Keywords: Awareness; fatigue; adolescent; athletes

ÖZET Amaç: Bu çalışmanın amacı, adölesan sporcuların ve sedanter bireylerin vücut farkındalık ve yorgunluk şiddetini karşılaştırmaktır. **Gereç ve Yöntemler:** Çalışma 13 farklı spor dalında (futbol, basketbol, yüzme, hentbol, güreş, boks, atletizm, voleybol, karate, badminton, yelken, tekvando, judo) lisanslı 81 sporcu (22 kadın, 59 erkek) ve aynı yaştaki 81 (37 kadın, 44 erkek) sedanter ile gerçekleştirildi. Sosyodemografik veriler kaydedildi. Her iki grup tarafından Vücut Farkındalık Anketi (VFA) ve Yorgunluk Şiddeti Ölçeği doldurduldu ve veriler karşılaştırıldı. **Bulgular:** Katılımcıların yaş ortalaması 15.27±1.23 yıl, beden kitle indeks ortalamaları sporcular için 21.20±2.82, sedanterler için 20.74±2.55 idi. Sporcular ve sedanter grup arasında VFA toplam puanı açısından fark saptanmadı. VFA alt ölçeklerinden Vücut Sürecindeki Değişiklikler ve Tepkilere Dikkat (VFA-1) puanı, sedanterlerde sporculara göre daha yüksekti. Sporcuların yorgunluk şiddeti sedanter gruba göre daha düşüktü. Her iki grupta da yorgunluk ve beden farkındalığı arasında ilişki saptanmadı. Sadece kadınlarda, Hastalık Başlangıcı (VFA-4) ve yorgunluk arasında bir ilişki vardı. **Sonuç:** Bu çalışmanın sonuçları, vücut farkındalığının sedanter adölesanlarda daha yüksek düzeyde olabileceğini, yorgunluk şiddetinin ise sporcularda daha az hissedilebileceğini gösterdi.

Anahtar Kelimeler: Farkındalık; yorgunluk; adölesan; sporcular

With the current developments in technology and various communication techniques, there has been a gradual decrease in the physical activity of young people. Therefore it is of great importance that children are encouraged to take up sport from a young age. The effect of sports on individuals at professional or amateur level has been

clearly demonstrated in the literature.[1] Selecting an appropriate sport, especially when development of the body structure has not yet completed, will ensure a protective and health-promoting direction for future effects. In addition to improving physical health, sporting activities, which have a considerable place in the development of the mental and emotional state, are positively associated with academic and behavioral performance.[2] Sport affects the physical and cultural structure of youth society, and is an important issue that needs to be considered in relationship to self development, such as personal body awareness.

According to the International Physical Activity Classification, individuals with <3000 MET-min/week physical activity are classified as not very active or physically inactive individuals.[3] This grading reveals individuals who do not have regular physical activity habits. When a young person does not have enough physical activity or do regular sports at school or in the family environment carries a health risk for the future. This risk, although considered individually, can lead to significant economic losses in societies.

Body awareness is an interactive and dynamic process that occurs with the individual perceiving his / her body and its actual actions. This concept includes physical sensations such as body position and heart rate, the perception of complex sensations such as pain, and mind-body connection.[4] Body awareness is shaped by one's attitudes, beliefs, and experiences in a social and cultural context.[5] The effect of regular sports on the body awareness of young people has not been previously investigated in the literature. Although the benefits that can be gained by the athlete compared to sedentary individuals are known in terms of physical fitness, general health and performance, there is a need to explain the relationship of sports to body awareness.

Sports can lead to reduced fatigue levels due to the development of functional capacity from the physical effects, strengthening of the musculoskeletal system, a reduction in maximum VO_2 consumption, and increased vital capacity. However, various loads applied to athletes during training and competitions may cause fatigue. Fatigue, which has many dimensions, is an experience not only of physical parameters but also of emotional and mental states. It can affect each individual's daily life differently at the same time and is known to be strongly correlated with depression and quality of life.[6,7] Fatigue has a negative effect on young people's sleep qualityand can be classified pathologically and physiologically.[8,9] The aim of this study was to compare body awareness and fatigue severityin young athletes and sedentary adolescents, and to thereby demonstrate different aspects of sports.

HYPOTHESIS

H_0: There is no difference between adolescent athletes and sedentary individuals in terms of physical awareness and fatigue severity.

H_1: There is difference between adolescent athletes and sedentary individuals in terms of physical awareness and fatigue severity.

MATERIAL AND METHODS

The study was conducted between November 2017 and February 2018 in 4 sports clubs (Trabzon DSI Karadeniz Sport Club, Trabzon Basketball Sport Club, Akçaabat Tütün Sport Club, Trabzon Yeşilova Sports Club) and 2 high schools (Trabzon Sports High School and Gazi Anatolian High School). Official permits were obtained from all sport clubs. The permits were submitted to the Board of Ethics Committee during the application process. The participants were divided into two groups of 81 athletes and 81 sedentary subjects. The athletes were active in football, basketball, swimming, handball, wrestling, boxing, athletics, volleyball, karate, badminton, sailing, taekwando and judo. Those included in the study were aged between 12 and 18 years, able to communicate verbally and able to write. The parents of the participants were informed about the study details. They read and signed the informed consent form. Totally 38 individuals (sixteen of them didn't complete the surveys, one of them had neurological disease and 21 of them had injury within the last two weeks) excluded from this study. The sociodemographic data (age, body height, body weight, body

mass index) of all participants were recorded. The Body Awareness Questionnaire (BAQ) was used to assess body awareness and the Fatigue Severity Scale was used to evaluate fatigue severity.

The sample size was determined by power analysis in the G * Power 3.1.9.2 program. To compare the athletes and sedentaries in terms of variables, 90% power and 0.50 effect size were determined as 70 for each group. Sampling groups 81 were taken despite the possibility of missing data in the scale.

This study was performed according to the principles of the Declaration of Helsinki Approval for the study was granted by the University of Health Sciences, Kanuni Education and Research Hospital Clinical Research Ethics Committee (22.11.2017 date 2017/60). All the volunteers read and signed an informed consent form.

BODY AWARENESS QUESTIONNAIRE (BAQ)

The validity and reliability of the Turkish version were demonstrated by BAQ Karaca and Bayar in their thesis study. This questionnaire consists of 18 items and aims to determine the normal or non-normal sensitivity level of body composition. Each item is scored with a1–7 likert-type response, where 1= I totally disagree and 7= I totally agree. Item number 10 has an inverse element and is scored in reverse. The questionnaire is evaluated over the total score, with a higher score indicating much better body awareness. The BAQ consists of four sub-dimensions: The Changes in the Body Process and Attention to Responses (BAQ-1), Body Responses Prediction (BAQ-2), Sleep-Wakefulness Cycle (BAQ-3) and Disease Startup (BAQ-4).[10] The internal consistency is very good on athletes and sedentary individuals included our study (Cronbach's α= 0.84; Cronbach's α= 0.82).

FATIGUE SEVERITY SCALE (FSS)

Armutlu et al. conducted validity and reliability studies of the Turkish version of this scale.[11] There are 9 items in the scale, which is assessed with a 7-point Likert-type scoring (1: Absolutely disagree, 7: Absolutely agree). A lower total score indicates less fatigue. The cut-off score for fatigue that may cause problems is accepted as ≥4.[12] FSS is also used in adolescents.[13]

STATISTICAL ANALYSES

Data were analyzed using SPSS 22.0 software (Statistical Packagefor Social Sciences Inc. Chicago, IL, USA). In the evaluation of 2 independent group, the Student's t-test was used for variables with parametric distribution (body weight, body mass index, fatigue level, BAQ, BAQ-1, BAQ-3 and BAQ-4) and the Mann-Whitney U test for those with non-parametric distribution (age, body height and BAQ-2). In correlation analyses, the Pearson correlation coefficient test was used for parametric distributions (between fatigue level and BAQ, BAQ-1, BAQ-3, BAQ-4) and the Spearman correlation coefficient test for non-parametric distributions (between fatigue level and BAQ-2). In the evaluation of the data, a 95% confidence interval was used. A value of $p<0.05$ was accepted as statistically significant.[14]

RESULTS

PARTICIPANTS

The demographic characteristics are shown in Table 1. The study included 162 participants, comprising 81 athletes and 81 sedentary subjects. In the athlete group there were 13 different branches: Football (n=14, 17%), boxing (n=13, 16%), wrestling (n=11, 14%), swimming (n=9, 11%), basketball (n=9, 11%), handball (n=7, 9%), athletics (n=6, 8%), karate (n=4, 5%), volleyball (n=3, 4%), badminton (n=2, 2%), sailing (n=1, 1%), taekwando (n=1, 1%), and judo (n=1, 1%). A total of 59 females (22 athletes / 37 sedentary) and 103 males (59 athletes/44 sedentary) were included in this study. The athletes were determined with significantly higher mean body height and body weight compared to the sedentary group ($p<0.05$) (Table 1).

The fatigue and BAQ-1 sub-dimensions of the athlete and sedentary groups were found to be significantly different ($p<0.05$). The athletes had lower fatigue severity and BAQ-1 score than the sedentary individuals. There was no significant difference between the groups in terms of BAQ, BAQ-2, BAQ-3 and BAQ-4 parameters ($p>0.05$) (Table 2).

TABLE 1: Comparison of sociodemographic data of athletes and sedentaries.

Parameter	Athlete (n=81)	Sedentary (n=81)	p
Age (year)	15.41±1.47	15.12±0.92	0.57
Height (cm)	172.95±10.52	169.97±8.18	<0.01*
Body weight (kg)	63.91±12.98	60±9.59	0.04*
Body Mass Index (kg/m^2)	21.20±2.82	20.74±2.55	0.81

Statistically significant differences (p<0.05). Values are reported as mean±standard deviation.

TABLE 2: Comparison of fatigue level and BAQ in athletes and sedentaries.

Parameter	Athlete (n=81)	Sedentary (n=81)	p
Fatigue Level	3.28±1.23	3.75±1.27	0.01*
BAQ	82.5±18.47	85.67±16.33	0.21
BAQ-1	27.14±7.06	29.06±5.91	0.03*
BAQ-2	31.64±8.31	32.53±8.15	0.49
BAQ-3	28.43±7.41	29.13±6.39	0.63
BAQ-4	18.27±4.72	19.07±4.40	0.23

Statistically significant differences (p<0.05). Values are reported as mean±standard deviation. BAQ: Body Awareness Questionnaire, BAQ-1: The Changes in the Body Process and Attention to Responses, BAQ-2: Body Responses Prediction, BAQ-3: Sleep-Wakefulness Cycle, BAQ-4: Disease Startup.

No correlations were determined between BAQ and fatigue severity in between adolescant athletes and sedentary individuals (p>0.05) (Table 3).

DISCUSSION

In this research, adolescent athletes and sedentary individulas were compared in terms of body awareness and fatigue severity. There was no difference between the athletes and the sedentary group in respect of the body awareness. The changes in the body process and attention to responses were better in the sedentary group than in the athletes. The fatigue severity of athletes was lower than in the sedentary group.

Body awareness is the ability of the individual to differentiate physical responses from environmental and personal factors.[15] On the scale used in this study, body awareness is examined in four subdimensions. Sedentary individuals were found to have better body awareness than the athletes in terms of the Changes in the Body Process and Attention to Responses (BAQ-1) subscale. In this subdimension context, it is questioned how the individual is affected by exercise-induced changes in the level of energy. Athletes who exercised regularly demonstrated less fatigue and stiffness compared to the sedentary group. In this sub-dimension, the 13th item questions whether a significant reaction is noticed in the body in case of fatigue. Since the tolerance of athletes to fatigue is expected to be greater than that of sedentary individuals, the reactions given are expected to be lower. This explains why it is much easier for sedentary individuals with earlier fatigue potential to notice changes. This study also showed that BAQ is required to develop a unique scale that evaluates body awareness in athletes because of the low number of parameters associated with athletic individuals. There is a need for further studies to support this result.

According to the current study results, the BAQ total score, The Changes in the Body Process

TABLE 3: Relationship between fatigue level and BAQ.

Relationship	Fatigue in athlete (n=81)	Fatigue in sedentary (n=81)	Fatigue in total (n=162)
BAQ	r:-0.03-p:0.73	r:-0.19-p:0.08	r:-0.11-p:0.15
BAQ-1	r:-0.05-p:0.62	r:-0.13-p:0.24	r:-0.03-p:0.66
BAQ-2	r:-0.08-p:0.46	r:-0.17-p:0.11	r:-0.12-p:0.11
BAQ-3	r:-0.09-p:0.40	r:-0.13-p:0.22	r:-0.13-p:0.07
BAQ-4	r:-0.04-p:0.67	r:-0.19-p:0.09	r:-0.06-p:0.40

Statistically significant differences (p<0.05). Values are reported as mean±standard deviation. BAQ: Body Awareness Questionnaire, BAQ-1: The Changes in the Body Process and Attention to Responses, BAQ-2: Body Responses Prediction, BAQ-3: Sleep-Wakefulness Cycle, BAQ-4: Disease Startup.

and Attention to Responses (BAQ-1) and sleep-wakefulness cycle (BAQ-3) of sedentary females were found to be better than those of female athletes. It was thought that this difference might be related to other factors such as the number of training sessions, the duration of active engagement in sports, performance level and trauma history, which could have affected the body awareness of the athletes. There is a need for further studies to support this result.

Body awareness is a complex concept involving psychological and physiological effects. It has been suggested that psychological factors are very important, although an absolute consensus has not been reached. Anxiety and depression are among the most common mental problems in young individuals.[16] In this context, stress and anxiety are thought to play a role in body awareness. In a study by Courtosis et al., body awareness was found to have an effect on anxiety and depression.[17] However, to the best of our knowledge, there has been no previous study conducted on athletes. In addition, when the concerns of professional athletes are considered, such as loss of popularity, fear of losing, and intensity of training, body awareness can be adversely affected. As the athletes in the current study were around 15 years of age, it can be concluded that they do not have enough experience in stress management. Therefore, there is a need for further studies to investigate the level of stress in more elite athletes.

The results of the current study showed that sedentary individuals reported more fatigue than athletes. This difference can be attributed to the better physical fitness of the athletes as a result of training. Differences in the physical fitness values of young individuals have been shown according to different sports.[18] Similarly, in a study by Alkurt, it was reported that sports training has important effects on the anthropometric and sporting performances of individuals.[19] Another study by Aslan and Çınar reported that athletes were better in terms of parameters such as lower limb strength, vertical jump and anaerobic power compared to sedentary individuals.[20] In addition, the positive effects of physical activity have been shown on aerobic fitness, cardiovascular function, adiposity, cardiac adaptation, muscle performance and postural balance.[21] Thus, in these situations reported by different researchers, it can be seen that athletes may have many advantages over sedentary people in terms of fatigue. It is also thought that the emotional state can affect fatigue. Physically active individuals are less prone to symptoms such as depression than those who are not active.[22] Moreover, it has been reported that individuals who perform sports have better results than sedentary individuals in terms of happiness, physical and social function, and general and mental health.[23,24] It is thought that the improvements in these parameters may contribute to the athletes feeling less fatigue both mentally and physically.

CONCLUSIONS AND RECOMMENDATIONS

In conclusion, regular sports activity can have positive effects on the severity of fatigue in young healthy individuals. Different exercise programs are being implemented to improve the body awareness of athletes. In this context, the results of exercise programs such as yoga and Tai Chi, which have been proven to improve the body-mind relationship, are available in the literature.[25,26] None of the athletes in the 13 sports branches within the scope of the current study had participated in these kinds of additional interventions. As the results of the study demonstrated that the athletes had lower body awareness than the sedentary group, this suggests that sport alone is not sufficient to improve body awareness. Sports and body awareness exercises can be practiced at the same time. There is a need for further studies to investigate this difference. In addition, since the sedentary individuals had better body awareness than the athletes in this study, body awareness may be related to different parameters such as sport history, trauma history, performance, achievement, sociodemographic characteristics and quality of life rather than the sports branch. It is seen as limitation that these cases are not examined in our study. Another limitation is that physical activity levels of sedentary individuals are not examined.

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Conflict of Interest

No conflicts of interest between the authors and / or family members of the scientific and medical committee members or members of the potential conflicts of interest, counseling, expertise, working conditions, share holding and similar situations in any firm.

Authorship Contributions

Idea/Concept: *Murat Emirzeoğlu, Arzu Erden;* ***Design:*** *Murat Emirzeoğlu, Arzu Erden;* ***Control/Supervision:*** *Murat Emirzeoğlu, Arzu Erden;* ***Data Collection and/or Processing:*** *Murat Emirzeoğlu, Arzu Erden;* ***Analysis and/or Interpretation:*** *Murat Emirzeoğlu, Arzu Erden;* ***Literature Review:*** *Murat Emirzeoğlu, Arzu Erden;* ***Writing the Article:*** *Murat Emirzeoğlu, Arzu Erden;* ***Critical Review:*** *Murat Emirzeoğlu, Arzu Erden;* ***References and Fundings:*** *Murat Emirzeoğlu, Arzu Erden;* ***Materials:*** *Murat Emirzeoğlu, Arzu Erden.*

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