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THE ROLE OF THERAPEUTIC EXERCISES ON THE POSTURE OF COMPUTER-GAMES USERS WITH LBP

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ABSTRACT

Aim: Available data indicates that there are some relations between computer games and postural deformities in children, but these data are less clear. The aim of this study is to find the effect of a short term exercise therapy on disability, postural correction and low back pain in computer game players.
Material and Method: the 48 persons of game players in coffee nets of Isfahan who to part in this survey were suffering from back pain and 96 persons with the same age from 14 to 25 participated in this study voluntarily were health. Users with low back pain were treated for twelve weeks of exercise therapy The pain intensity and disability of the subjects were measured through applying QUEBEC and OSWERTRY questionnaires. Posture screen and tested by a qualified physical body through postural deviations were used in different situations. All variables were measured again after treatment.
Results: The prevalence of low back pain and disability after treatment, respectively, 53% and 58% recovered. The Average of total deviations of center of gravity in experimental group before treatment were 4/0 ± 7/2 vs. 3/0 ± 2/1 2/25 in healthy individuals. Experimental group show greater postural deviations about 2/25 times relative to health group, but after treatment with 53% recovery, posture of experimental group and healthy individuals were similar.
Discussion: Users of computer games with back pain had greater postural deviations. Exercise Therapy leads to improvement in pain, disability and postural deviations in computer games users. Posture correction exercises should include for low back pain patients and users of modern computer games (games with dynamic sensor) and computer games.

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Introduction

Back pain is a world disease[1-3]. This disease has a lot of causes and it is hard to diagnosis exactly, in a way that directing to pathology and exact diagnose is not easy and also it is not without any mistakes[4-6]. Low back pain causes creating

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compensatory strategies in the people suffering from it. Delayed starting of multifidus and transverse abdominal muscles has been reported in the people with chronic low back pain[7]. an increasing exposure of the younger generation to media is a worldwide phenomenon can be related him[8, 9]. studies have shown that the use of electronic games and computers by children and adolescents can be associated to pain, pain syndromes and repetitive strain injuries (RSI) of the musculoskeletal system[10-13]. Although significant research has been done in relation to the patient's low back pain But about the role of exercise in children and adolescents with chronic nonspecific low back pain, limited research has been carried out[14], This study aimed to investigate the failure of depth sensory receptors in the lower extremities and trunk to set the correct posture and body orientation in patients with chronic low back pain in to the computer game users and also examine the effect of special exercise therapy to correct this condition.

Methodology

A total of 48 patients with chronic LBP game users aged 14-25 years, mean height (160cm ± 6/3cm) and weight (50kg ± 16/03) as the experimental group and 96 users of computer games healthy 14-25-year age range and average height (161cm ± 5/4cm) and weight (52kg ± 14/06kg) participated in the study as controls. The control group subjects were recruited on a voluntary basis. Computer users were chosen by them visiting game net around Isfahan city and with no pain or oral presentations on health, and clinical tests were performed by a pathologist. Experimental group patients with idiopathic low back pain and pain that lasted more than three months, patients without history of surgery or any illness related variables of the study. The control group was physically healthy and had no history of athletics as well. QUEBEC standard and OSWESTRY questionnaires were applied in order to assess the degree of pain intensity and disability. QUEBEC questionnaire included 25 five-alternative questions and pain intensity in each question was rated from zero to four and the whole questionnaire was rated from zero to one hundred. Scores zero to 25 indicate little pain, 26 to 50 disease with medium pain, 51 to 75, high pain and above 75 implies acute and disabling pain[6]. OSWESTRY questionnaire included ten six-alternative parts which investigates the manner of people’s performance in daily activities. Each part rates the degree of disability in performance respectively from zero (desirable performance without feeling painful) to five (disability in performing activity due to intense pain). OSWESTRY disability index equals the score totals of 10 parts multiplied by 2 and owns the value of zero to 100. Disability index of zero shows that the individual is healthy and able to do daily activities without pain. Zero to 20 is low ability, 21 to 40 is medium disability (moderate), 41 to 60 is high disability, 61 to 80 is intense disability and higher score means totally acute disability wherein the individual cannot do anything[15].

Owstry questionnaire identity's weakness and intolerance to perform daily activities in patients with chronic pain[15]. Dynamic Stability platform was used in order to measure balance in terms of posture and biomechanics[16]. This device consists of a circular scaled page called balance platform which placed on a large sphere, including multi-sensors and could easily switch directions in different horizontal positions. Powered balance detector was adjustable to set at varying degrees of stable and unstable. During the experiment, subjects placed on this platform, when adjusted on unstable degrees, the platform beneath the subject was sensitive to minor changes in the center of gravity and by changing leg pressure it easily switched positions proportional to the applied torque. But at a relatively stable level the platform resistance against the torque caused by the weight of one increased and platform orientation caused by moving the center of gravity, decreased.

The method of running the test started with placement of the subject on the balance platform with the defined position, center of gravity coordinates with the center base of the support and the platform was placed completely in horizontal plane. After hitting the button for 20 seconds all the fluctuations were recorded and transferred to the computer memory. Proportional to the volatility of individual extremities, the moment that gravity center moved away from the center point, the platform beneath would move away exactly the same and the subject dynamically tried to set their foot pressure to the center of the supporting surface.

The subject attempts to dynamically match its center of gravity with the center of the circle and balance platform axis. The better motor control and balance person had, the better ability they had to control platform and the fluctuations and fluctuations of the center point of platform gravity axis was less.

The tests performed in different situations, each of them represents a test is. This consisted of standing in the anatomical position, standing trunk flexion of 45 degrees. These tests were run on two conditions are relatively stable and unstable surface that a total of 4 tests, including standing in anatomical position in a relatively stable surface stability (test I), standing in the anatomical position in the unstable position (test II), standing at a 45-degree trunk flexion on a relatively stable surface (test III) and standing at a 45-degree trunk flexion on an unstable surface (test IV).

Each test was run three times and three times the average of the individual scores on various measures of sensorimotor function was recorded. This series of tests measure the body posture deviations. The above values of the parameters in this case, the sign of the vertical axis deviation greater height and thus were considered a weakness in the sensorimotor system. There was a two minute rest between each two consecutive tests. Then the patients attended a 12 -week therapeutic exercise program consisted of 36 sessions. The early sessions were about 30 minutes which gradually increased to 90 minutes in the late course. The exercises included a warm-up with stretching, aerobics and rhythmic training, specific exercises for lower back pain and balance exercises and cool down exercises. All tests were repeated after treatment. The statistical analyses to compare the techniques of multivariate analysis of variance for repeated data were used as well as the Cross Correlation to

examine relationships between variables. The study design was a three factor or factors within groups. The first factor is the stability of surface standing (with two relatively stable and unstable), the second condition, establishment status (two-level standing half bent) and the third factor postural deviations, (with three levels: Total, anterioposterior and mediolateral), respectively. Operating between back pain patients versus experimental group also consists of individuals were considered. Comparing the level of Type I error ($\alpha = 0/05$) was considered.

Findings

The average amount of pain and disability for patients through two Owstry Quebec and the averages were obtained before and after treatment is shown in Figure 1.

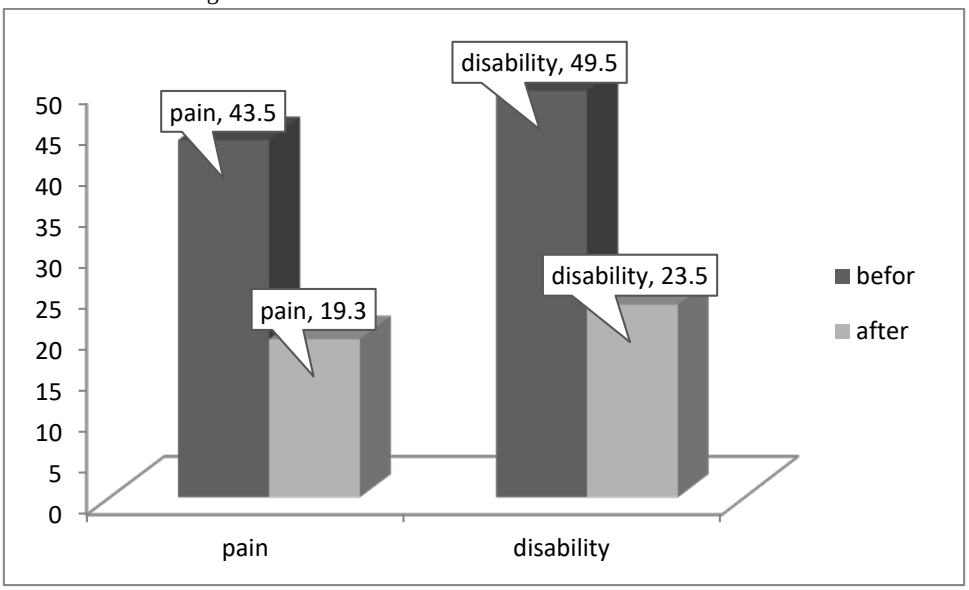

Figure 1. The pain and disability in the experimental group before and after treatment

According to this chart, the severity of low back pain was 43.5 and severity of disability was 49.5. After treatment, the average of pain was 19.3 and the average of disability was 23.5. Wilcoxon test showed that this reduction was significant in both cases (P = 0/001). Success rate in the treatment of pain was 57.5% and for disability was 52%.

Table 1, shows the parameters relating to COG deviation of COBOS in various test of two groups. According to the first test in accordance with diversity table total index in control group was 1/3 ± 0/63 and the experimental group was 1/9 ± 1/05 that patients were in total 1.8 times more than control group had a postural deviation (P = 0/001). Index A / P and M / L respectively shows 1.9 and 1.5 times were more patients than control group had COG deviations. This case reflects impaired posture in patients with chronic low back pain in the standing anatomical position.

In this test after treatment, patients in the COG in total index to 1/5 ± 0/6 was 34% better than the before. Also after the treatment in this case, parameters A / P and M / L, respectively to 32% and 26% improvement was observed. So that after treatment between the experimental and control group there showed no significant meaningful (P = 0/67). In the both control and experimental groups diversity index COG from COBOS in the test II were more than test I, this increase in the healthy group was 1.9 and the patient before treatment was 2.3. After treatment, an improvement in postural control was perfectly acceptable, so that the increase was 1.5%. and there was not difference between the patients and the control group in balance (P = 0/2). In chart 2, the interaction between the stimulation of postural deviations and the treatment factor has been shown to cause disease. As can be seen in this chart mean deviations in the pre-treatment phase and the patients with low back pain (level of confidence in the stability of the black square with) was significantly more than healthy subjects.

Nonetheless in unstable situations, the rate of deviation in cog of the low back pain patients, are increased by three times. However, after exercise therapy (continuous line with squares bright gray) pattern of deviations in stable state and unstable patients and healthy individuals became completely the same. This result indicates that the treatment has been significantly effective. Tests were run in flexed posture, III and IV, which are also shown in table1. The third test indicators in the control group was Total, A / P and M / L, respectively, 1/1 ± 0/6, 0/9 ± 0/5 and 0/9 ± 0/4 and the experimental group before and after treatment, respectively 2/12 ± 1/1, 1/7 ± 1 and 1/6 ± 0/8, that COG deviation in the experimental group indicates respectively, 2.2-fold, 3.2-fold and two-fold greater than the variation in the control group. Patients after treatment have significant decrease in COG deviation like II and III tests and there weren't any significant changes with health group. When IV test was done in semi flexion posture and in unstable situation, there was a meaningful increase in health and experimental group after treatment in relative to III test. Generally, in both standing and semi-flexion posture, when the surface was unstable, the amount of distortion increased.

In the test IV comparing to the third one control group 8 times and experimental group 2 times increased and by using from analyzing manner the effect of treatment were calculated in COG deviation. chart 2 compare the rate of COG deviation from COBOS in various indicator of dynamic balance in experimental group, before and after the treatment. The values of these charts are the average of total deviation in various supporting surface positions and various postures. Also Factor analysis have shown that there is no difference between body position changes from static to semi flexion.

Table 1. The mean vertical axis COBOS posture of the various tests in experimental and control groups before and after treatment.

M/L	A/P	Total	Groups	Tests
1/00±0/54	1/10±0/5	1/30±0/63	Control	Test I
1/4±0/63	1/9±0/83	2/10±0/98	Experimental before treatment	
1/00±0/5	1/7±0/44	1/50±0/6	Experimental After treatment	
1/4±0/5	1/5±0/7	1/9±0.73	Control	Test II
2/4±1/6	3/5±2/3	3/94±2/80	Experimental before treatment	
1/3±0/73	1/4±0/8	1/8±0/9	Experimental After treatment	
0/9±0/4	0/9±0/5	1/1±0/6	Control	Test III
1/6±0/8	1/7±1	2/14±1/1	Experimental After treatment	
1/2±0/6	1/1±0/5	1/4±0/6	Experimental before treatment	
1/5±0/6	1/4±0/9	1/9±1/1	Control	Test IV
2/8±1/7	3/2±2/4	3/87±2/64	Experimental before treatment	
1/6±0/6	1/5±0/7	1/9±0/7	Experimental After treatment	

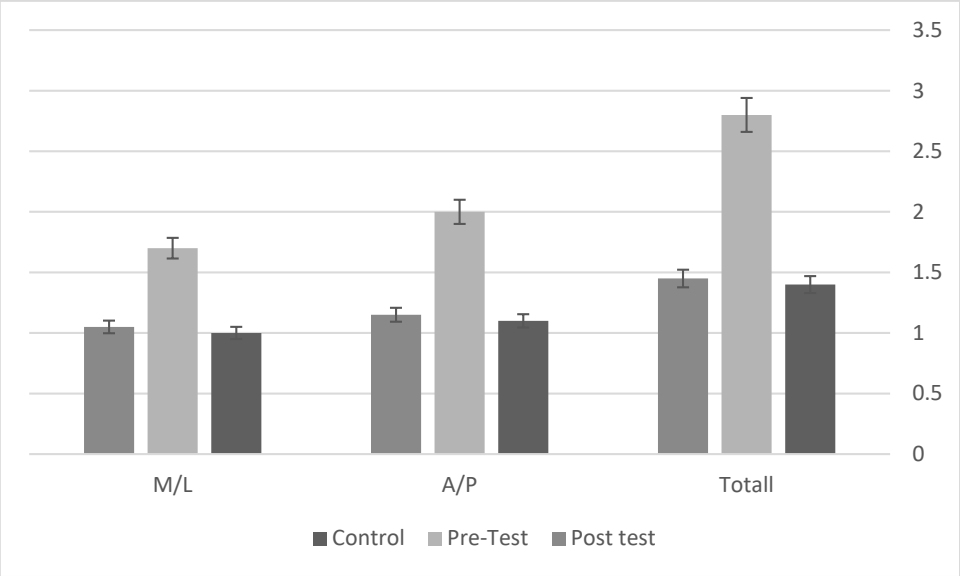

Figure 2. the mean deviation from the vertical axis COBOS postural equilibrium in several indicators of low back pain patients before and after treatment and compared with the control group.

Discussion

In this study in order to research about posture injuries in chronic low back pain, deviation of COG from COBOS was measured by dynamic balance system. Increase in The rate of deviation from COG represent abnormal posture in chronic low back pain patients. This injury of posture that can cause of pain itself, it can cause induce asymmetrical stress in several joints specially in lumbar vertebrae too. Some studies show that chronic low back pain patients in comparison with health group, move their COP more backward. This position is associated with increase in lumbar lordosis and result in increase in asymmetrical shear and compression force in lumbar discs and vertebrae. It can cause disc herniation and irritate nerves root[17, 18]. This asymmetrical forces result in increase or exacerbate the low back pain. For discussion about this posture injury, there are several hypotheses, one of them is related to dysfunction of proprioceptive receptors.

Our study shows that low back pain patients have one significant dysfunction in balance or posture injury. This results are in accordance with finding of sinnott and byl[17, 18]. Utilization of unstable surface of balance platform for assessing posture injuries cause that rate of abnormalities in COG, shows itself greater. Because the rete of oscillations in unstable surface of balance platform are so great, for maintaining balance control, the individual forced to use pelvic strategy of balance. In this strategy, maintaining the balance in active way is occurred by more information from proprioceptive receptors of lumbar and trunk[5, 19]. If the deviation of COG increase in this situation, this is an indicator that proprioceptive of lower body do not work well. In previous studies, the researcher assessed proprioceptive function in total way, but the characteristic of this study is that we assessed it in specific way in comparison and measuring the function of proprioceptive in lumbar and lower extremities. The use of unstable surface in this study, caused that more complex mechanism of motor control involved and it can show the weakness of patients more obviously. After sport therapy the posture pattern of low back pain patients is similar to health group. This indicate that the exercises that used in this study, can improve lumbar and lower extremities proprioceptive function as well, because the rate of COG now is similar to health group.

After treatment, the experimental group shows improvement in pain and function. Utilization of rhythmic aerobic exercises result in increase in secrete endorphin and can cause relaxation and decrease pain. Performing stamina and strength training for lumbar area, increase stamina and strength of the muscles in this area and can decrease pressure on the lumbar disc and nerves and increase in core stability. eventually This situation can decrease pain. This finding is accordance with salami, jalili and associates[4]. Performing balance exercises improve muscle activity in the patients and result in better functioning of proprioceptive that communicate with CNS. The more quality if this information that CNS receive, the better movement pattern performed. Good functioning of proprioceptor can facilitate using of suitable movement pattern. Patients that obtain suitable movement pattern can return to their occupations sooner and learning good posture that is important in secondary prevention.

Conclusion

Patients with abnormal posture are exposed to injuries and one of them is low back pain. Impairment in proprioceptive of lumbar area are more than impairment in proprioceptive in lower extremities. Performing sport training, specially balance exercises can improve pain and disability and in addition increase the function of proprioceptive. Assessing the function of lumbar proprioceptive, especially in dynamic situations and complex locomotors tasks during prognosis and treatment, is essential.

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