INTRODUCTION

An accelerometer is a device for measuring acceleration of the body in motion. It is used for various purposes, the load indications, distance measuring, a reference to the aircraft and missiles, and more. The accelerometers work is based on measuring inertial forces acting on the tool during movement. To the inertial mass, which is free to move in only one dimension, that direction acceleration acting, and she moves in line with the current acceleration. Moving the weight is recorded and further used for the intended purpose. There are accelerometers that do not use the principle of inertial mass movement except vibrations, change capacity, optical abilities and others. Today you can buy a small integrated accelerometers in the form of an integrated circuit. Accelerometer for recording activity using devices is called accelerographs.

Platform system for measuring the force includes a number of hardware units (electronic transformer - platform itself, the signal for bringing the system in certain conditions the device and recording device signals) and signal processing software. Each unit is in this investigation. Together with the hardware platform for bringing the system in certain conditions the device should lead to a good linearity, good range of measurement and others.

Available software could control the operation of platforms for force and immediate processing, although the user could make some choices. The main choices are related to the measurement range of force and velocity model. Force measurement range should be appropriate for the activity, and if not excessively low (for example, a small child) or too large (for example, when you take a long or triple jump) default range is usually sufficient. It is important to look for the recognizable sign is chosen so that the range of misfit, so wandering the center of pressure coordinate values of Ax and Az (range too large) or smoothing the force Fy (range, too). Another choice is a model of speed. A lot of this things has been said about this in the past, but today AD converters and computer storage capacity and processing speed are high enough performance, so that’s not an issue. Model at 500-2000 Hz can be seen in the current literature, but the model at 1000 Hz offers the usual choice. It should be noted, however, such overlapping spectrum (where the higher the frequency of reflected and seen as a lower frequency in the data) occur due to the higher frequencies that may be seen in the signal. These higher
frequencies are usually removed before the electronic filtering AD conversion, because it can not be removed when the data are numerical. However, if the problem is mounting platform (as noted above) the higher frequencies have very low amplitude and therefore is not a problem for the user.

The purpose of this research (Comstock, et al., 2011), was to determine the concordance values Myotest instrument for measuring the production of strength and power exercises in weightlifting in the squat and bench, with gold standard computerized linear transducers and force measurement platforms. Fifty-four men (the bench: 39 - 171 kg, squat: 75-221 kg) and 43 females (bench, 18-80 kg, squat: 30-115 kg) (average age 18-30) did a test of the strength of one repetition maximum (1MP) in performing squats and bench. Testing procedures were consisted of force from the jump squat exercise and ejections at bench and in 30% of each subject’s 1MP. During each measurement, the instrument Myotest and Celesko linear transducer in direct cooperation with the BMS system (Ballistic Measurement System, Entrance panel technology for measuring force, Skye, South Australia) were placed on the pole for the weights. A strong positive correlation between these two systems and the determinants of high correlation (R2) was demonstrated at the bench ejection force (r = 0.95, p, 0.05) (R2 = 0.92), followed by casting bench strength (r = 0.96, p, 0.05) (R2 = 0.93), the power of jump squat (r = 0.98, p, 0.05) (R2 = 0.97), and the strength of the jump squat (r = 0.91, p, 0.05) (R2 = 0.82). To conclude, when Myotest instrument set in the vertical axis of the barl, it is a valid instrument for measuring the force and power of the most commonly used motions during the exercises.

The study (Crewther, 2011) investigated the validity of two kinematic systems for assessing the force and power of the squat jumps. Twelve trained men did series of exercises with weights of 20 kg, 40 kg, 60 kg, 80 kg, on Kistler portable measuring board. The usual rectilinear transducer (Gymaware [GYM]) and accelerometer (Myotest [MIO]) were attached to the bar in order to assess the highest accumulated force (PF) and peak power (PP). Performed in all tests GYM and MYO measurements were calculated to be PF and PP in a very strong correlation (P 0.05-0.001) with the values obtained from the plate to measure the force and strength (r = 0.59-0.87 and r = 0.66-0.97). The differences between the PF and PP values between 2 and plate kinematic system for measuring the strength and power were almost not important, but a number of differences and improper error ‘viewing angle, specially when lifting 20kg (PF slope > 170 N, PF error > 335 N, PP slope > 400 W, PO error > 878W). In summary, the assessment of PF and PP and linear transducers mounted accelerometers showed extremely strong correlation values, but these estimates were limited by the presence of numerous errors and slopes.

The main objective of this study was to investigate the correlation of mechanical properties of the muscle force obtained from myotest (Copyright @ Myotest SA) and tensiometric platform (HBM @ German & Serbian TRC), which are located at the Faculty of Sport and Physical Education in Niš.

METHODS

In this study, a subject was performing a vertical jump by myotest protocol for a half squat jumping. The examinee took two protocols with hands on hips. The total number of the presented was ten rebounds.

During the jumps and leaps each examinee carried myotest which was performed on tensiometric platform. Data acquisition was performed automatically by myost protocol, while data is collected manually from the platform using a software package Catman (HBM @ Germany).

Variables that were treated in this study are:

First maximum force measured in Newtons PF (N) Second time needed to obtain power PT in milliseconds (ms) and 3rd RFD force growth as an index of explosive strength.

All mechanical parameters will be obtained from the curve force - time on the basis of standardized methods.

Statistical analysis, using the SPSS software, given the inter correlation analysis and t-test examined differences paametara mechanical muscle force in the vertical jump.

RESULTS

On the basis of programs and Catman Myotest obtained values of maximum force PF time to achieve that power PT. RFD values were calculated from the ratio of PF / PT.

Descriptive statistics

<table>
<thead>
<tr>
<th>Variables</th>
<th>Device</th>
<th>N</th>
<th>Mean</th>
<th>Std. Dev.</th>
<th>Std. Error</th>
</tr>
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<tbody>
<tr>
<td>PF</td>
<td>PL</td>
<td>10</td>
<td>1705.17</td>
<td>86.03</td>
<td>27.20</td>
</tr>
<tr>
<td></td>
<td>MY</td>
<td>10</td>
<td>1654.20</td>
<td>119.87</td>
<td>37.91</td>
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<tr>
<td>PT</td>
<td>PL</td>
<td>10</td>
<td>269.90</td>
<td>37.79</td>
<td>11.95</td>
</tr>
<tr>
<td></td>
<td>MY</td>
<td>10</td>
<td>295.00</td>
<td>1.05</td>
<td>.33</td>
</tr>
<tr>
<td>RFD</td>
<td>PL</td>
<td>10</td>
<td>6.44</td>
<td>.81</td>
<td>.26</td>
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<tr>
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<td>MY</td>
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<td>5.15</td>
<td>.81</td>
<td>.26</td>
</tr>
</tbody>
</table>
Table 1 shows the values of the measures of central tendency and measures of dispersion. Also, in the last column to the data error of the mean. These measures of descriptive statistics shows that there are differences between them when it comes to data obtained with different measuring instruments. However, the mean differences above all, do not point out that if there is a statistically significant difference, as will be seen in subsequent analyzes.

Correlation between variables
From Table 2, we see a high correlation index of explosive strength RFD with variable maximum force and maximum PF PT time that the significance level of 0.01. T is somehow expected, given that the index is calculated as the ratio of these two measures.

Correlation between the maximum force and PF time to achieve that force PT is not statistically significant (- .322), and its negative sign indicates an inverse proportionality.

Analysis of arithmetic means
Table 3 shows the values studnetovog t-test for independent samples was small. Statistical significance was not obtained at the maximum value of force that PF was measured using two different devices. Statistili significant difference was the maximum time for which PT has reached the maximum force which can be the reason of different sampling, ie, different frequencies of operation. As a consequence of the previous significant difference was observed in the index of explosive strength, which was expected.

CONCLUSION
On the basis of the research in order to identify differences in the measurement of the mechanical properties of vertical jump, the following conclusion could be done:

First: The force, measured by the method set out in piezoelectric devices tensiometric force sensors and platforms using electric accelerometers obtained within statistically insignificant small difference. Thus, we have shown that these two types of measurements are very reliable.

Second: The time required to develop maximum force was different. Most likely the reason for the great difference in the number of sampling and frequency of the devices. The myotest operates at a frequency of 200 Hz while the platform surface tension, and its sensors were set to 2000 Hz. This difference of as much as 10x is probably the cause of the obtaining of various arithmetic mean value of the maximum time measurement.

REFERENCES


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