ERGONOMIC TOOLS FOR ANALYSIS BIOMECHANICAL ASPECTS RELATED TO LOW BLACK DISORDERS AT WORK

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Introduction:

The painful disorders of the spine - low back disorders - are among the most frequent complaints of the general population in many countries of the world, affecting young and old people. It is one of the most prevalent musculoskeletal disorders related to work, according to the Bureau of Labor, in 2010, was the cause of 227,000 cases of absence from work (BLS, 2011). This is the largest single cause of health disorders and absenteeism work-related occupying prominent place among the causes of granting sickness allowance and disability retirement (BRASIL, 2001; MENDES, 2007). Thus, this article aims to identify the different ergonomic tools apply in the risk analysis of biomechanical factors related to back pain as well as relate the advantages, limitations and disadvantages to using each method.

Method:

This study was carried out a literature review. Were analyzed 30 articles on the subject, these were investigated, according to a taxonomy suggested based on the literature.

Results:

Methods identified were divided into three groups: subjective, observational and direct measurement. Subjective methods are those collected from the assessment of participants. For better visualization and comparison of results was prepared Table 1, which presents the methods, their application, advantages, disadvantages and limitations. Considered subjective because are methods that require the issuance of opinion and judgments. Include questionnaires, reports, interviews, diaries, scales and evaluation from filming. The simple observation methods involve analysis of a situation or reality, for example, the working environment and the execution of a particular task, and backlog for analysis and interpretation, since the number of analyzed factors varies according to different techniques. The advanced observation methods consist of objective analysis, from specific software, data collected in video or computer and are developed for the analysis of activities that present high postural variation. The methods of direct measurement are constituted by sensors attached to the object of study allow the measurement of exposure variables at work: range of motion, joint angulation and speed.
Table 1 - Types methods

<table>
<thead>
<tr>
<th>Principle</th>
<th>Subjetivos</th>
<th>Observation</th>
<th>Direct measurement</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>Judgment of the participants</td>
<td>Analysis and record the situation under study</td>
<td>Sensors attached to the object of study</td>
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<tr>
<td>Advantages</td>
<td>Easy, cheap, wide application</td>
<td>Real, practical, low cost</td>
<td>Quantitative, high accuracy</td>
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<tr>
<td>Disadvantages</td>
<td>Subjective, unquantifiable,</td>
<td>Observers can influence. Can be time consuming.</td>
<td>High cost. Requires operator with good training.</td>
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<tr>
<td>Example</td>
<td>Questionnaires, interviews, scales, reports</td>
<td>NIOSH, RULA, REBA</td>
<td>Electromyography, Monitor lumbar movements</td>
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</table>

Source: Prepared by the authors

Discussion:

Select a method for analysis of physical workload depends on the method's ability to quantify the risks attributed to the cause or condition of musculoskeletal disorders. Several biomechanical analysis methods can be used in the evaluation of low back disorders related to work. However, there is no gold standard biomechanical model, and the appropriated instrument must be selected according to the characteristics of the work and the work environment to be evaluated. Quantitative models explain the relationship between work-related factors and the risk of low back disorders, allowing effective prevention measures (AKAY, 2011). Despite the subjective methods are highly effective, are supposedly less reliable than observational methods and direct measurement. However, the methods of direct measurements are more accurate, but are expensive and difficult to apply in large field studies. The cost, time and training required to perform the analysis and interpretation of data collected vary between different methods. When selecting the most appropriate methods, these factors should be considered. Many methods are available for free by developers. The knowledge of the characteristics of each tool allows the selection of an appropriate technique for each analysis, allows for the study and ensuring effective and safe data collection, and analysis and interpretation. The association between methods also ensures the reliability of the results and allows addressing parameters that are not covered by one of the methods. This work was limited to inability to approach in detail all available tools, as these are numerous and, in many cases, have similar analysis principles.

Keywords: low back disorders; ergonomics; human factors; risk assessment; assessment tools.

References:
