Postural analysis of seafood farmers through the use of motion sensors

Cristhiane Guertler a, Giselle Mari Speck b, Lucas José Garcia b, Gislaine Figueiredo a, Giselle Schmidt Alves Díaz Merino b, Eugenio Andrés Díaz Merino b, Walter Quadros Seiffert a

aDepartamento de Aquicultura, Universidade Federal de Santa Catarina, Florianópolis, Santa Catarina, BRAZIL, bDepartamento de Engenharia de Produção e Sistemas, Universidade Federal de Santa Catarina, Florianópolis, Santa Catarina, BRAZIL

1. Malacoculture in Brazil

Among the activities carried out in mariculture, the cultivation of molluscs has expanded in various countries, being responsible for a large part of international seafood trade. The world production of molluscs in 2012 was 15 million tonnes, with oyster farming standing out with more than 4.5 million tonnes, producing a yield of approximately 3.7 billion dollars (FAO, 2014). In Brazil, malacoculture is predominantly carried out in Santa Catarina State and is comprised of the cultivation of mussels (Perna perna), oysters (Crassostrea gigas) and scallops (Nodikepten nodosus) (EPAGRI, 2014).

The activity has become more professionalised with the emergence of small businesses and the increase in scales of production. However, there is little literature on the postural risks that exist in this working environment and their impact on the health of the worker. In light of the importance of this activity for the development of Santa Catarina State and the involvement of workers in this sector, subsidiaries were sought in ergonomic methodology to study the activities carried out in oyster farming.

1.1 Material and Methods

The study consisted of the analysis of the stage in which structures containing the oysters are removed from the sea in a mollusc-fattening farm located in Florianópolis (Figure 1). All participants signed a free and informed consent agreement, that contained the objectives and integrity of the survey.

The capture of movements during the activity was carried out with the Xsens MVN Biomech, a piece of equipment composed of 17 inertial sensors that track segments of the body, their orientation, position and movement (Roetenberg et al., 2013).
1.2 Results and Discussion

The results indicated the positions of the neck, shoulders, back, hips, knees and ankles as critical points (Figure 2). During the removal of structures from the sea the seafood farmer often rests his knee on the edge of the boat to balance the body, creating discomfort and tension in this region.

In addition, the feet are in an unfavourable position, forcing the joints and compromising balance, even increasing the chance of falling into the sea. In this activity, both the knees and the feet run the risk of musculoskeletal injuries (Stefani et al., 2011).
According to the results obtained in the study, it was observed, furthermore, that the angle of flexion in the hips is close to 100 degrees. The maximum angle of flexion for these joints should not exceed 85 degrees (Tilley, 2005). According to Iida (2005), the mean value, of a voluntary kind, for the hips in this situation is 70 degrees.

In various stages of the productive process of mollusc cultivation intense physical effort occurs throughout practically the whole working day, especially in relation to the upper limbs, the shoulder
region, neck, thighs and hips, in a standing posture and with the torso flexed forward. In this way, the work carried out can cause a series of complications that have already been diagnosed in fishermen, such as lumbago, herniated disks, degenerative conditions of the vertebral disks, among others (Rosa et al., 2010).

The results obtained make evident the importance of ergonomic studies that can help with recommendations for work-related activities in mariculture, such as, for example, preventative action that indicates the correct postures for the performance of such activities. In this context, the use of tools, such as the one used in this study, that help with postural analysis and that can be applied in the field, have been more and more important in ergonomic studies.

References


