A BIOMECHANICAL ASSESSMENT OF BREAST KINEMATICS DURING DIFFERENT EXERCISE MODALITIES

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INTRODUCTION

Effective sports bras that minimise breast displacement are crucial to reduce breast discomfort during exercise [1]. The majority of breast biomechanics literature centers on treadmill activity. However, until the movement of the breast is understood during different actions, optimum breast support parameters for sport specific activities are unknown. This study aimed to determine the kinematics of female breast movement during; running, jumping and an agility task, in order to inform breast support design during different multiplanar activities.

METHODS

Ten 34D cup participants had passive markers attached to their right nipple and trunk, to calculate relative 3D breast displacement [2]. Supported and unsupported anterioposterior, mediolateral and vertical breast displacement was calculated during treadmill running (10kph), maximum counter movement jumps and an agility T-test.

RESULTS AND DISCUSSION

Exercise modality influenced the magnitude of breast displacement when bare breasted (p<.006) and when wearing a sports bra (p<.013). The greatest anterioposterior (57 mm) and mediolateral (67 mm) breast movement was found during the agility task, and the greatest vertical breast movement (86 mm) found during jumping (Fig. 1). Agility and running had equal distributions of movement in each direction (30% AP, 36% ML, 33% V), whereas jumping activities produced a larger distribution in the vertical direction (26% AP, 27% ML, 47% V). The sports bra was more effective at reducing anterioposterior breast displacement during running (51%) than either jumping (35%) or the agility task (41%), more effect at reducing mediolateral displacement during jumping (64%) than either running (47%) or the agility task (49%), and more effective at reducing vertical breast displacement during running (66%) than jumping (50%) (Fig. 2).

Figure 1: Multiplanar breast displacement during different exercise modalities in a bare breasted condition.

Figure 2: Multiplanar breast displacement during different exercise modalities in a sports bra condition.

Exercise modality has an impact upon the magnitude and distribution of multiplanar breast displacement, and also upon a sports bra’s effectiveness at reducing this breast movement. Future studies on sports bra functionality should ensure that the exercise modality is carefully
selected, as the results may differ. Sports bra manufacturers may wish to design sport specific products, as a sports bra effectiveness is influenced by the type of exercise [1].

REFERENCES