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The Weightlifter's Blackout Phenomenon

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Introduction :

The Weightlifter's Blackout is a period when all lights must be turned out or covered to prevent them being seen by the others. Also it is a temporary loss of consciousness experienced during weightlifting or another strength training activity when the breath is held [1] [2][12].

Many weightlifters at one point or another in their careers will experience the phenomenon of "blacking out." This will most likely occur in lifts where the breath is held for a longer than normal time, such as in a military press, squat clean, or squat. It is a strange feeling, one of quickly, but not suddenly losing consciousness. It difficult to describe, but it seems that the world is in slow motion and the weightlifter has difficulty continuing his movements. He does not always lose complete he you may pass out [2] [3].

While an annoying phenomenon in Weightlifting is the light-headedness that athletes sometimes experience after standing up out of a heavy clean. The often given explanation is that during the clean the bar presses into the neck and restricts blood flow in the carotid artery thus reducing the perfusion of oxygenated blood to the brain. However, this explanation is not correct. Although the Weightlifters' blackout is caused by a reduced cerebral perfusion pressure, that is a lack of oxygen to the brain [8], the impact or pressure of the bar on the carotid artery is not the reason. The weight of the bar is acts downwards on the shoulders not on to the carotid artery in the neck. Instead, the phenomenon can be attributed to the reduced cardiac output as a result of a lack of venous return to the heart and a delay in the filling of the heart's left ventricle [1][12].

Figure (1) phenomenon of "blacking out.

During standing, both the position of the cerebral circulation and the reductions in mean arterial pressure (MAP) and cardiac output challenge cerebral auto-regulatory (CA) mechanisms. Syncope is most often associated with the upright position and can be provoked by any condition that jeopardizes cerebral blood flow (CBF) and regional cerebral tissue oxygenation (cO2Hb) [10].

As the Weightlifter catches the clean and begins to rise, blood pressure is very high due to factors described above. However at the end of the movement, when the athlete has completed the clean, there is a sudden and acute drop in BP as a result of: A reduction in the occlusion of blood flow in working muscle thereby causing an increase of blood perfusion into the lower body; and, a release of the very high pressure within the chest and abdomen as the Valsalva Maneuver ends when the athlete releases air and takes a breath [2] [3].

These factors conspire to momentarily reduce Blood Pressure (BP) to 25-50 mmHg [3] [8] causing a lack of blood returning to the heart and a reduction in cardiac output. This situation has a potential to cause insufficient avoid this situation by completing the jerk as soon as possible i.e. beginning the dip within 1-3 seconds of rising out of the clean. Trying to regain full consciousness by hyperventilating or waiting for the head to clear does not assist and may endanger the athlete further [1][12].

Weight Lifters Heart Adaptation:

How does the heart adapt, if at all, to dealing with phenomenal increases in blood pressure during Weightlifting movements? Unfortunately there is no complete agreement between researchers as studies have produced different findings. Some findings suggest that a form of adaptation known as concentric hypertrophy [8]. Other researchers, however, have refuted this and put forward the view that the effects of strength training on the heart are small or insignificant in comparison to untrained individuals [9] [10]. It is probable that a change to the heart in many of the subjects examined was small and close to the methodological error of echocardiography [3][4].

The cardiovascular fitness of Weightlifters

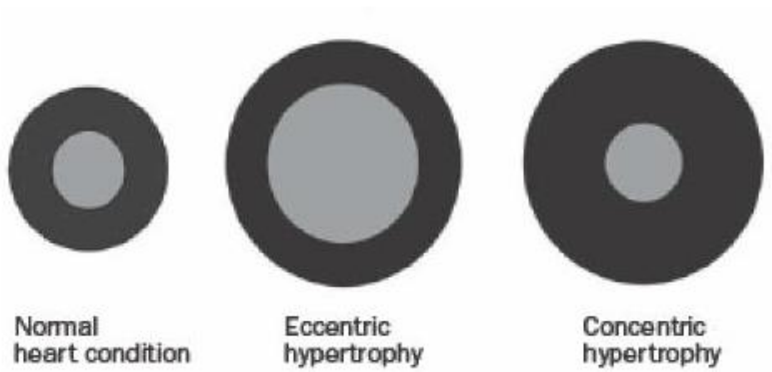
When training excessively, the heart develops several myocardial adaptations causing a physiological state of cardiac remodeling. These morphological changes depend on the kind of training and are clinically characterized by modifications in cardiac size and shape due to increased load [7] [8]. The highest recorded pressure was 570 Torre. At prolonged submaximal contractions intramuscular fluid pressure oscillated independent of contraction force. Redistribution of cardiac output may affect cerebral perfusion by increased cerebral vascular resistance; supporting the view that cerebral perfusion depends on arterial inflow pressure provided that there is a sufficient cardiac output [1] [6] [8] [9].

The existence of resistance training-induced left ventricular (LV) concentric hypertrophy is equivocal. Although some have described significant LV hypertrophy, others have suggested that training-induced LV hypertrophy is proportional to increased fat free mass (FFM) and thus a normal physiologic response to training [4] [5] [6].

In reality, all forms of high intensity training are associated with adaptive changes of the heart, and in particular hypertrophy of the left ventricle (MacFarlane) from which blood is pumped around the body [9].What is in question is whether there are different adaptive changes in weightlifters as compared to endurance athletes, or for that matter other strength athletes. Furthermore, if there are differences, which are beneficial? It has been stated that eccentric hypertrophy of the left ventricle is found in elite distance runners and bodybuilders [1] [3] [6].

This suggests that the type of training performed by bodybuilders, where repetitions are commonly performed to failure, has a significant endurance training effect. In eccentric hypertrophy, the internal cavity dimension of the left ventricle is increased and this allows the heart to pump a greater volume of blood per beat (stroke volume). In concentric hypertrophy, which according to some researchers is more prevalent in Olympic Weightlifters, the left ventricle is unchanged or is smaller in internal cavity dimension [4]. This reflects the predominance of low repetitions in the training of weightlifters, where intensity is far more important than endurance. But then comes Crossfit, in which athletes strive for fitness in both strength and endurance. A study by Edwards (2012) provided not unexpected evidence that Crossfit athletes showed greater ventricular cavity dimensions and greater ventricular wall thickness, adaptations exhibited by endurance athletes and bodybuilders [1]. It is concluded that LV dimensions and volumes are strongly dependent on oxygen transport capacity in normal subjects practicing different modes of training, and that the gender differences, if LV dimensions are related to aerobic work capacity, are smaller than previously reported [1] [9] [10] [11].

Figure (2) Three shaps of Heart hypetrophy



Concentric Hypertrophy: Increase in mass and wall thickness of the left ventricle with a minimal decrease in internal cavity dimension. Eccentric Hypertrophy: Increase in mass and wall sickness of the left ventricle and increase in internal cavity dimension [4] [8].

In relation to the training of weightlifters, there is a common understanding among coaches that training with intensities greater than 80% is fundamentally necessary. At such intensity, only low repetitions can be performed and this is particularly the case when fatigue interrupts the execution of good technique. Weightlifters tend to perform one set of low repetitions every 2-3 minutes in training and this is not particularly challenging in terms of their endurance. As a result, Weightlifters are often not concerned about their endurance fitness and probably the vast majority has little or no knowledge about cardiovascular adaption [1].

Conclusion:

In hearts of athletes performing either strength or endurance training, typical structural and morphological adaptations have been previous reported. Due to an increased dynamic load, the heart of the endurance athlete responds predominantly with eccentric hypertrophy. Endurance-trained hearts are subject to increased volume and pressure loading, leading to specific myocardial changes such as left ventricular dilatation and increased left ventricular mass. Strength training is associated with a marked elevation in systolic and diastolic blood pressure. The heart of the strength-trained athlete responds to sudden and large pressure overload with concentric left ventricular hypertrophy, in some cases accompanied by increases in left ventricular diameters. However, the development of an endurance-trained heart and a strength trained heart should not be considered an absolute concept. Both strength training and endurance training cause left ventricular hypertrophy, but left ventricular wall thickness is found to be higher in strength training, while dilatation of the left ventricle is a prominent feature of endurance trained hearts.

Recommendations:

It is worthwhile therefore to pose several considerations that weightlifters should be concerned about their respiratory endurance fitness and have to gain more knowledge about cardiovascular adaption. It is important to emphasize the periodic breathing exercises for the lifters, and to provide them with the necessary information about their importance in confronting the blackout phenomenon during competitions.

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