'Athlete's heart' differs between men and women

December 15 2020, by Kat Long

The hearts of female athletes adapt differently to the rigors of sports

training compared to their male peers, according to a new study that could change the way doctors evaluate women's heart health.

"Athlete's heart" describes physical and electrical changes, or remodeling, to the heart as a result of intense training. While it's not a medical condition that requires treatment, researchers are now studying how factors like sex, age and sport contribute to heart changes.

For the new study, researchers at the University of Siena and the Institute of Sports Medicine and Science in Italy compared the hearts of 360 female and 360 male Olympic athletes. They were divided into four groups according to their sport type: skill, such as golf and table tennis; power, including weightlifting and snowboarding; mixed disciplines like soccer and tennis; and endurance, including rowing, swimming and long-distance running.

Each athlete had a clinical exam, an electrocardiogram (ECG) to test the heart's electrical activity, and an echocardiogram to measure the heart's size and shape. The results, published Tuesday in the American Heart Association journal *Circulation: Cardiovascular Imaging*, showed women had different electrical and structural changes compared to their male counterparts.

The findings show that "a sex-based approach for interpreting the complex features of 'athlete's heart' in women is needed," said lead author Dr. Flavio D'Ascenzi, an assistant professor of sports cardiology at the University of Siena.

The ECGs in women more often showed T-wave inversion, which can signify an underlying heart muscle disease that affects the lower right chamber and carries a risk of sudden death, particularly during exercise. But that finding may not be cause for alarm in female athletes in the absence of symptoms, D'Ascenzi said.

"Accurate knowledge" about how the right side of the heart has been remodeled is essential to differentiate between athlete's heart and serious heart conditions, he said.

Compared to male athletes, women also had proportionately larger right and left ventricles, the heart's two lower pumping chambers. Women engaged in endurance sports had the biggest increase in the size of the right ventricle and right atrium (the upper chamber), followed by those in mixed disciplines and power sports. Skill sports had the smallest effect on remodeling the right side of the heart. The same held true for the left ventricle and left atrium.

The dynamics of cardiac remodeling in Olympians doesn't easily translate to the general population, D'Ascenzi said. However, because the researchers analyzed the effects of different sports, he said the data could potentially apply to non-Olympic athletes who play the same sports and train with a similar intensity as those in the study.

In addition, female athletes' physicians can use the findings to further individualize how test results are interpreted, said Dr. Elizabeth Dineen, an assistant professor of cardiology at the University of California Irvine.

"Yet they must use caution, as this study shows there are gender differences, but we don't have concrete (normal) values," said Dineen, who was not involved in the study.

The next step, D'Ascenzi said, is to obtain evidence of training-induced heart changes with advanced imaging methods, such as cardiac MRI, and to do similar studies in non-professional female athletes.

Looking at more diverse groups would also be useful, Dineen said. Studying athletes versus sedentary controls, comparing groups of

different races or ages, and following study participants over time could elicit more data about the exact mechanisms behind cardiac remodeling in athletes.

"We see the changes," Dineen said, "but I don't think the medical community fully understands what is causing these changes."