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Is the wrist bone connected to heart risk?

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Measuring the wrist bone may be a new way to identify which overweight children and adolescents face an increased risk of developing cardiovascular disease, according to research in *Circulation: Journal of the American Heart Association*.

"This is the first evidence that wrist circumference is highly correlated to evidence of insulin resistance," said Raffaella Buzzetti, M.D., senior study author and professor in the Department of Clinical Sciences at "Sapienza" University of Rome, Italy. "Wrist circumference is easily measured and if our work is confirmed by future studies, wrist circumference could someday be used to predict insulin resistance and cardiovascular disease risk."

In a study of 477 overweight/obese children and adolescents (average age 10), researchers found that wrist circumferences accounted for 12 percent to 17 percent of the total variance of insulin resistance. Insulin resistance is explained only by the size of the wrist's bony tissue and not by the fatty tissue, the researchers said.

Many studies have shown that atherosclerotic cardiovascular disease — caused by narrowing of the arteries — begins to develop in childhood. Insulin resistance, a condition in which the body makes insulin but can't use it efficiently to break down blood sugar, is a metabolic risk factor for later development of cardiovascular disease.

Higher insulin levels increase the risk of developing insulin resistance, which in turn increases the risk of developing cardiovascular disease.

Although excess body fat is linked to several heart disease risk factors including insulin resistance, measuring body fat in children is problematic partly because of how rapidly their bodies change during puberty, researchers said.

The researchers sought an easy way for doctors to identify young people at greatest risk. They measured wrist circumference manually with a cloth tape measure and a subset of 51 of the children also underwent a painless imaging technique called nuclear magnetic resonance for precise measuring of the bony area vs. fatty area of the wrist. "We decided to use a parameter traditionally connected to the frame size, reversing its traditional use as a correction factor for BMI" said co-lead authors Marco Capizzi, M.D. and Gaetano Leto, M.D., Ph.D.

All of the children underwent blood tests to measure their insulin levels and to quantify the amount of insulin resistance.

The analysis of the entire study group indicated that the wrist circumference accounted for 12 percent of the variance in insulin resistance and in insulin levels. The imaging analysis indicated that the wrist bone size accounted for 17 percent of the variance in insulin resistance.

The researchers found that the correlation between the cross-section of the wrist bones and the level of insulin in the blood or the amount of insulin resistance were much stronger than the correlation between the body mass index (BMI) and insulin levels or insulin resistance. BMI is a numeric value of weight and height used clinically to estimate whether a person is normal weight, underweight, overweight or obese.

Several recent studies show that high blood insulin levels are associated with increased bone mass. The way in which insulin may act as a growth factor has become clearer with the discovery of insulin-like growth

factor-1, a hormone with a chemical structure similar to insulin that regulates bone cell production.

Wrist circumference could be a marker for increased bone metabolism in the presence of high insulin levels. If so, wrist circumference may be an easy-to-detect measure of skeletal frame size that's not severely confounded by body fat variation around the time of puberty, Buzzetti said.

"One of the major priorities of clinical practice today is the identification of young people at increased risk for insulin resistance," she said. "This is a very, very strong link. Wrist circumference mirrors insulin resistance levels."

Provided by American Heart Association