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INVITED COMMENTARY

Male Health

Digit ratio links prenatal hormone exposure with adult lung function

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In a recent publication appearing in the *Asian Journal of Andrology*, a team of researchers investigated the relationship of early hormone exposure to adult lung function. In the publication, 'Second to fourth digit ratio: a predictor of adult lung function', Park *et al.*,¹ described known sexual dimorphisms in lung function and a role for sex hormones in the development and regulation of lung function: the predominantly-male hormone, testosterone, enhances airway inflammation and the predominantly female hormone, estrogen, promotes lung development and protects against inflammation. Increasingly over the last decade and a half, digit ratio (the ratio of the lengths of the index to ring fingers) has served as a convenient biomarker for prenatal steroid exposure, and is thought to depend on exposure to testosterone relative to estrogen during development.

Park and coworkers¹ measured the lung function of South Korean males and females who were hospitalized for an unrelated surgery. Information about smoking habits was collected and digit ratios were measured. They found a positive correlation between digit ratio and lung function, and secondarily, that the association was more robust in males than in females, evidenced by the fact that correlations between parameters of lung function and digit ratio persisted only for males when multivariate analyses were performed. Additionally, the relationship between digit ratio and lung function disappeared in smokers, indicative of the relatively greater influence of smoking on lung function. The authors concluded that low digit ratios predict poor lung function.

To further evaluate the findings, it is helpful to place the results in context with other digit ratio studies. Although digit ratio is regarded as a sexually dimorphic trait, differences between the sexes are small and ranges are overlapping. In virtually every report of significant sex differences, male digit ratio is lower than female digit ratio (more testosterone produces lower digit ratio). However, the present study found male values (0.955 ± 0.035) to be higher than female values (0.936 ± 0.030); the reason for the low female ratios is unclear. Race and ethnicity are also known to influence digit ratios. In one study comparing ethnic differences in children, a different Oriental (Han) population showed sex differences in digit ratio in the expected direction (males lower than females) with males averaging

0.94 ± 0.30 to female values of 0.961 ± 0.033 .² A separate study of adult male Han reported similar digit ratio values of 0.9478 ± 0.0322 for the right hand.³ Park and coworkers¹ postulated that age may have had an effect on digit ratio, but if so, the effect must have been subtle since age was not significantly correlated with digit ratio in males or females in their study. Furthermore, the utility of using digit ratio as a biomarker resides in its relative stability throughout life; admittedly, more attention has been paid to postnatal and pubertal modulations of digit ratio.⁴ Thus, investigation of age-related hormonal events later in life (e.g. menopause) and their influence on digit ratio may be warranted.

So then, does it matter that typical sex differences in digit ratio were not upheld in the present study? The researchers have claimed that low digit ratio is predictive of poor lung function in adulthood. The proposed explanation is a higher prenatal exposure of testosterone leading to compromised airway development. A possible flaw in this argument is that females in the study had the lowest digit ratios, yet they had better-than-predicted lung function and fewer females than males demonstrated compromised airflow, which is contrary to predictions of the study.

Despite some shortcomings in generalizability, due largely to the anomalous digit ratios of female participants, the overall association of digit ratio with several parameters of lung function is convincing. Perhaps the study could be replicated using participants of a different age range and/or ethnicity to further test the predictive value of digit ratio on airway function. Given the prevalence of airway diseases like chronic obstructive pulmonary disease and increasing discoveries of endocrine disruptors in the environment, attention should be paid to this study that links prenatal steroid exposure with adult lung function.

COMPETING INTERESTS

The author declares no competing interests.

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