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Statistical and preliminary cost-effectiveness analysis of noninvasive prenatal screening of 309, 996 cases in mainland China

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Objective

To determine whether primary noninvasive prenatal screening (NIPS-P) had a sufficiently high degree of accuracy to be cost-effective in mainland China compared to the first trimester screening (FTS) with contingent NIPS (NIPS-C).

Methods

Retrospective analyses of 309, 996 singleton pregnancies tested with NIPS to determine the detection accuracy of NIPS-P and NIPS-C. Also to prospectively compare the cost-effectiveness of NIPS-P with that of FTS and NIPS-C based on the calculated accuracies of the tests and the associated economic burden of Down syndrome for the family and the society.

Results

The detection rate (DR) and the positive prediction value (PPV) of NIPS-P and NIPS-C for three common chromosome syndromes was 99. 34% and 91. 48% versus 99. 60% and 93. 31%, respectively. There were no statistical differences between the DR ($\chi 2=0.5604$, $0.25<P<0.5$) and the PPV ($\chi 2=2.1042$, $0.1<P<0.25$) of NIPS-P and NIPS-C. The economic burden of Down syndrome was calculated at 1. 86 million Chinese Yuan (CNY) in mainland China in 2014. If the costs of NIPS were less than 1554. 03 CNY, NIPS-P would be cost-effective compared to FTS or NIPS-C.

Conclusion

Both NIPS-P and NIPS-C showed high detection accuracy. Our cost-effectiveness analysis showed that NIPS could be a cost-effective substitute for first trimester Down syndrome screening in the very near future.