

The detection of neural tube defects by second trimester alpha-fetoprotein levels

Dr. O Reynoldson, Dr. L Slade, Prof. J Dodd. Women's and Children's Hospital.

Objective

Alpha fetoprotein (AFP) was one of the first biomarkers to be correlated with risk of foetal anomalies, specifically neural tube defects (NTD)^{1,2}. When it was first introduced in clinical practice, it was a common method of screening³. Now that the use of first trimester anatomy ultrasound and first trimester serum screening is widespread, it is increasingly uncommon to detect a significant neural tube defect by serum screening in the second trimester. We sought to investigate if this is still a valid and useful method of screening in current practice.

Method

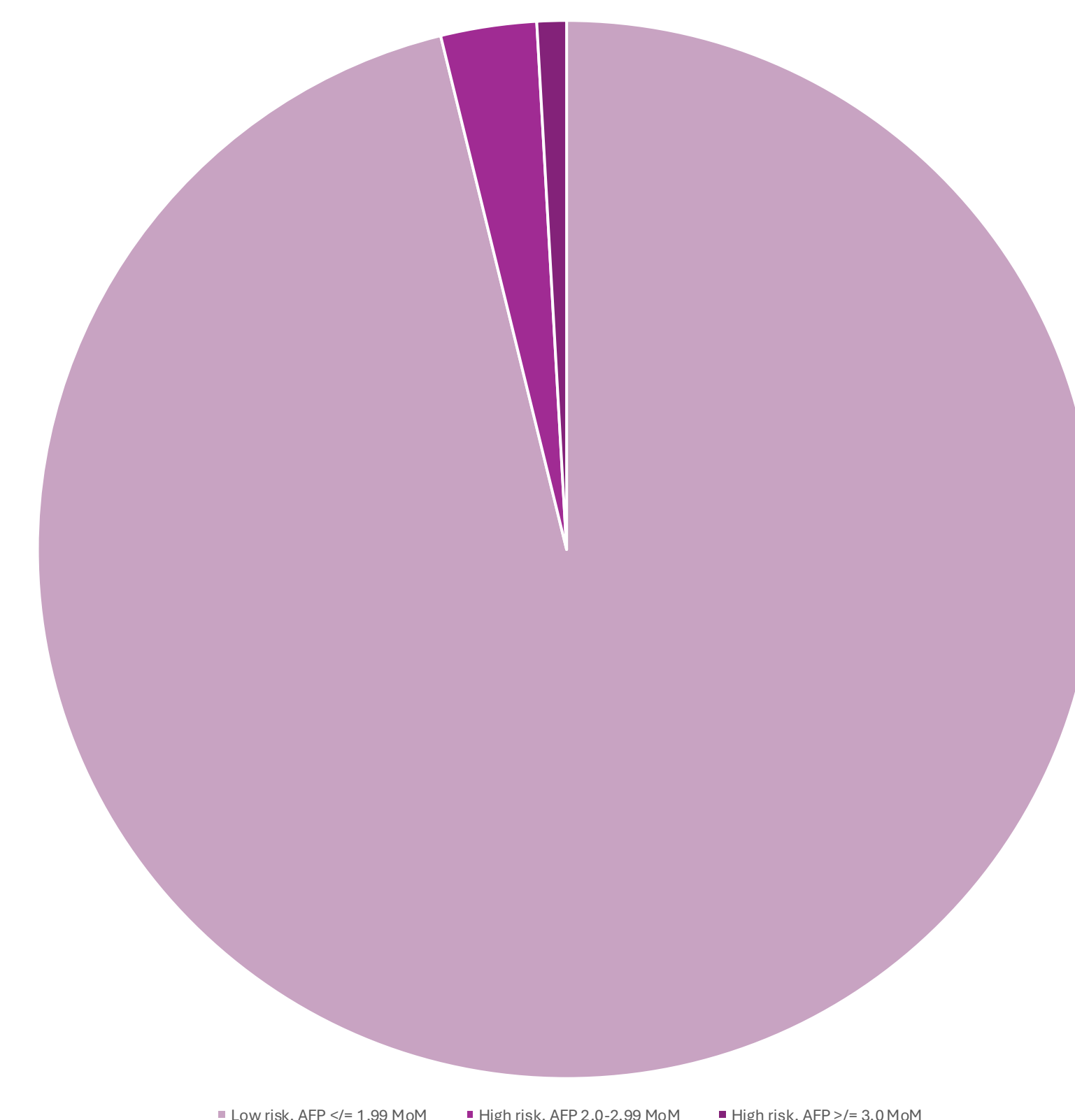
The state of South Australia has a statewide database for maternal serum screening results and for all registered birth anomalies. This includes those from live births, stillbirths and terminations of pregnancy, making it a comprehensive population-based assessment of prevalence for congenital anomalies. The two databases were linked for the years 2010-2022 including all cases of neural tube defects and all maternal serum screening results performed in second trimester including an AFP level. An abnormal AFP level was defined by ≥ 2.0 multiples of median (MoM) adjusted for gestation and ethnicity where available. The proportion of neural tube defect cases that were high risk vs low risk based on their AFP results was compared.

Design

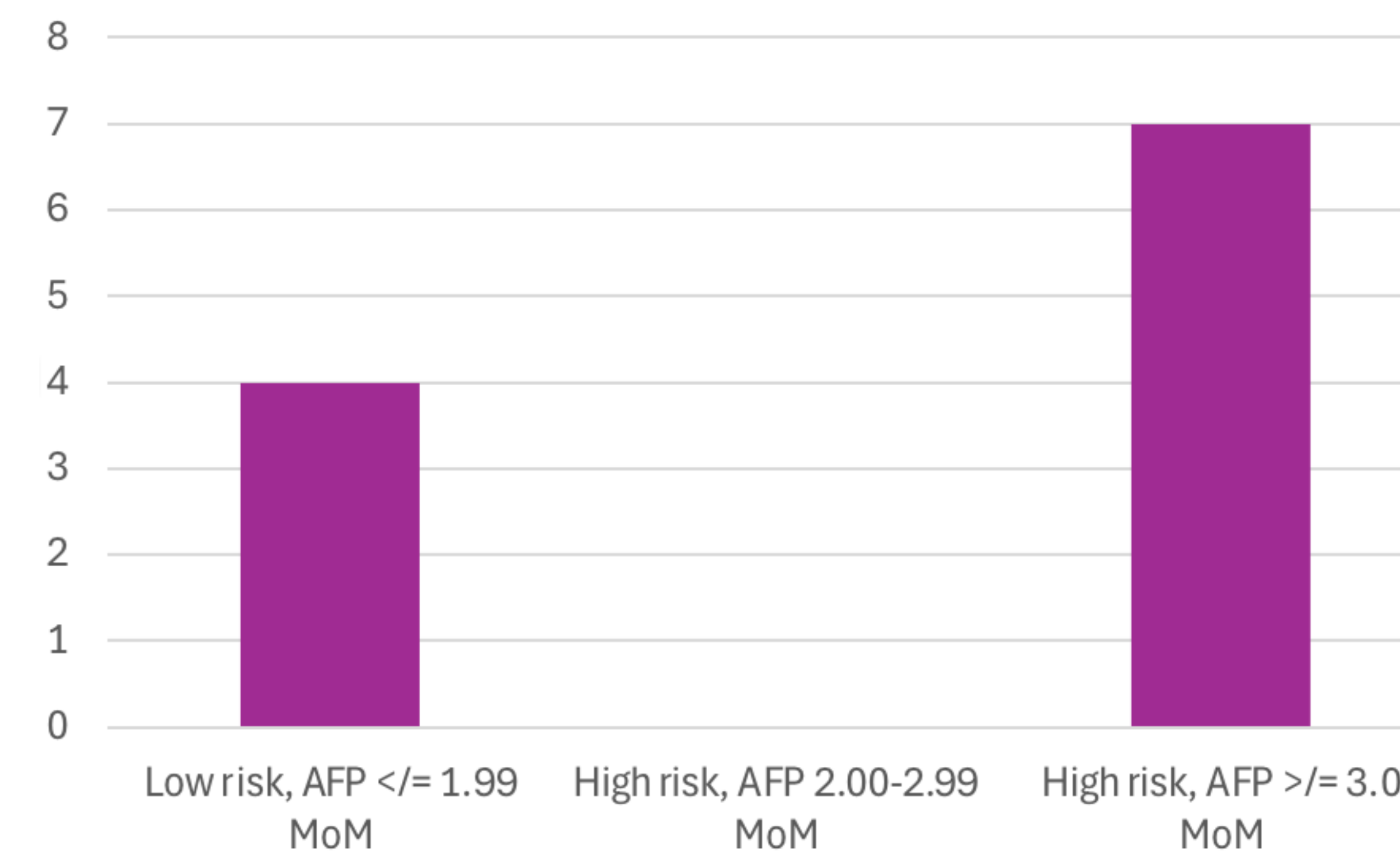
Retrospective cohort study of all cases of neural tube defects and all second trimester screening tests containing an AFP result.

Results

Across the study period, there were 16,939 screening test including calculation of neural tube defect risk. On average these were performed at 16 weeks. 16,420 (96.9%) were low risk with an AFP ≤ 1.9 MoM. Of the 519 (3.01%) screens that were high risk, 397 (76.5%) had an AFP level between 2.0 and 2.99. 122 (23.5%) had an AFP ≥ 3.0 MoM.



There were only 297 cases of neural tube defects across the study period. Only 11 of these had a matched second trimester screening test including AFP for that pregnancy. Of these results 4 (36%) were low risk with a serum AFP level < 2.0 MoM, and 7 (64%) were high risk. Of the high risk results, the lowest serum AFP was 3.1 MoM.



Conclusion

Serum AFP was not useful to screen for pregnancies affected by a neural tube defect in our current population. Discontinuation of this as a method of screening could be considered. Alternatively, consideration should be given to change the cut off level for high risk AFP from ≥ 2.0 MoM to ≥ 3.0 MoM.

References

1. P.C Leighton, M.J Kitau, Y.B Gordon, A.E Leek, T Chard. Levels of alpha-fetoprotein in maternal blood as a screening test for fetal neural-tube defect. The Lancet, Volume 306, Issue 7943, 1975, Pages 1012-1015
2. Brock JH. Alphafetoprotein and neural tube defects. J Clin Pathol Suppl (R Coll Pathol). 1976;10:157-64.
3. Wald NJ, Cuckle H, Brock JH, et al. Maternal serum-alpha-fetoprotein measurement in antenatal screening for anencephaly and spina bifida in early pregnancy. Report of U.K. collaborative study on alpha-fetoprotein in relation to neural-tube defects. The Lancet, 1977 Jun;1(8026):1323-1332.

