

Does maternal serum screening for Down syndrome induce anxiety in younger mothers?

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ABSTRACT

Introduction: To assess anxiety levels in mothers with low-risk pregnancies before and after offering routine serum screening.

Methods: A prospective study was carried out at the Kandang Kerbau Women's and Children's Hospital in Singapore from February 2000 to August 2000. We used standard statistical analysis and Spielberger's state-trait anxiety inventory (STAI) which consists of 40 items to assess anxiety. Anxiety levels were assessed at several stages: before serum screening counselling, after counselling but before serum screening, before the routine 20-week obstetrical screening ultrasound scan, and after ultrasound scan results were acknowledged four to six weeks later. As the STAI questionnaire has only been validated for an English-speaking population, only English-speaking women were recruited for the study. The subjects included 111 women between 15 to 20 weeks gestation that were randomly selected (without any risk factors) for serum screening counselling.

Results: Anxiety levels did not decline significantly after counselling by a trained nurse-counsellor. They were highest prior to counselling and were significantly higher compared to all other times in which anxiety was assessed. Anxiety levels were lowest after the serum screening and routine 20-week screening ultrasound scan results were acknowledged. They were also significantly lower compared to all other times in which anxiety was assessed.

Conclusion: Anxiety before serum screening was not abnormally high and routine serum screening offered by trained nurse counsellors did not significantly increase maternal anxiety in mothers with low risk pregnancies.

Keywords: anxiety, Down syndrome, maternal serum screening, state-trait anxiety inventory

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INTRODUCTION

Maternal serum screening is designed for all mothers, irrespective of a prior risk. It aims to identify a subgroup of mothers at higher risk, who can then be offered a diagnostic test for Down syndrome, from mothers below that assigned risk cut-off who do not require any further testing. Over the past decade, there have been tremendous advances in prenatal screening tests. Our institution has been offering Down syndrome screening by amniocentesis based on maternal age since 1987, routine maternal serum screening since 1999, and ultrasound nuchal translucency screening to selected mothers. However, little is known about the psychological aspect of such screening tests. The potential distress and worry engendered by undergoing a test and then waiting for its outcome may be overlooked.

There have been studies to evaluate anxiety levels of mothers undergoing prenatal screening tests⁽¹⁻³⁾. It is recommended that there be routine consultation with an antenatal care professional before testing to ensure informed consent prior to maternal serum screening⁽⁴⁾. However, to date, no local study has been performed to assess anxiety levels in mothers undergoing serum screening for Down syndrome in Singapore.

In a questionnaire assessment of obstetricians and gynaecologists between January and March 1999, 43% were not in favour or were ambivalent about serum screening. A third of these doctors were concerned that the maternal anxiety induced may outweigh the benefits. Our hospital survey showed that 80% of younger mothers have heard of Down syndrome or amniocentesis. As we move from an age-related screening programme for older mothers to one for all mothers based on serum screening, maternal anxiety may be provoked when serum screening is offered, due to sudden realisation that they may actually be at risk.

Patients need to understand why screening tests are being offered and how these may affect them. As patients gain greater autonomy, physicians need to provide patients with the risks and benefits of performing these tests as a basic ethical right.

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Table I. Characteristics of subjects.

Characteristic	No. of patients (n=111)
Mean age (in years)	28.83
Race (%)	
Chinese	85 (76.6)
Malay	19 (17.1)
Indian	4 (3.6)
Others	3 (2.7)
Religion (%)	
Catholic	6 (5.4)
Protestant	24 (21.6)
Buddhist	47 (42.3)
Muslim	19 (17.1)
Hindu	3 (2.7)
Others	12 (10.8)
Parity (%)	
0	65 (58.6)
1	32 (28.8)
2	11 (9.9)
3	3 (2.7)
≥4	0 (0)
Education (%)	
None	0 (0)
Primary	1 (0.9)
Secondary	41 (36.9)
Pre-university / Polytechnic	54 (48.6)
Tertiary	14 (12.6)
Postgraduate	1 (0.9)
Monthly income (%)	
<\$500	1 (0.9)
\$500-\$1499	4 (3.6)
\$1500-\$1999	7 (6.3)
\$2000-\$2999	29 (26.1)
\$3000-\$3999	36 (32.4)
\$4000-\$4999	20 (18.0)
>\$5000	14 (12.6)

Table II. Comparison of S- and T-anxiety scores for serum screening group (n=109) at various times throughout the study period.*

Stage	S-anxiety (Mean ± SD)	T-anxiety (Mean ± SD)
Before counselling (STAI-1)	36.73 ± 6.99	39.73 ± 6.53
After counselling (STAI-2)	35.50 ± 7.78	39.25 ± 6.94
Before US (STAI-3)	35.46 ± 7.34	38.96 ± 6.57
After US (STAI-4)	30.61 ± 5.66	38.55 ± 6.56

* 2 women had incomplete responses.

STAI: Spielberger's state-trait anxiety inventory; US: ultrasound scan

Counselling should be non-directive and include all relevant information⁽⁵⁾. Studies in the past have shown that adequate counselling before biochemical screening can help women decide whether to opt for the test, alleviate much of the anxiety associated with a false positive result and raise appreciation of the possibility of a false negative result⁽⁶⁾. Another study found that prenatal screening tests (Down syndrome screening included) were perceived by women

as being the most effective factor in reducing the levels of fear and anxiety experienced throughout pregnancy⁽⁷⁾. This study assesses anxiety levels in mothers before and after serum screening.

METHODS

This was a prospective study carried out at the Kandang Kerbau Women's and Children's Hospital (KKWCH) from February 2000 to August 2000. Anxiety was assessed using the Spielberger's state-trait anxiety inventory (STAI)⁽⁸⁾. This questionnaire consists of 40 items: 20 were designed to assess state anxiety (S-anxiety scale) and the rest, trait anxiety (T-anxiety scale). The STAI has been used extensively in research and clinical practice. The S-anxiety scale assesses how respondents feel "right now, at this moment". The T-anxiety scale evaluates how they "generally feel". As the STAI questionnaire has only been validated for an English-speaking population, only English-speaking mothers were approached and recruited for the study.

A research assistant interviewed consecutive low-risk pregnant mothers who were referred from a consultant's antenatal clinic for maternal serum screening for Down syndrome between 15 to 20 weeks gestation. Once recruited, the mothers were asked to complete STAI questionnaire (STAI-1) while waiting to see the nurse-counsellor. The research assistant filled in the mother's biodata. After counselling, the subjects were asked to complete a second STAI questionnaire (STAI-2). They were informed of the serum screening results a few weeks later before their routine 20-week screening ultrasound scan. On the day of their screening ultrasound scan, they were requested to complete the third STAI questionnaire (STAI-3). The final STAI questionnaire (STAI-4) was completed four to six weeks after their ultrasound scan, during a routine follow-up antenatal visit.

The patients' anxieties were compared with a reference population⁽⁸⁾ at the start of the study in order to establish a baseline level. Subsequently, they served as their own controls for the rest of the study and their anxiety scores were analysed for any significant difference. S-anxiety scores reflect how anxious the patient feels in response to a particular situation and is expected to significantly fluctuate in these different situations. T-anxiety, on the other hand, reflects the patients' inherent personalities and tendencies toward anxiety, which should not vary significantly under different circumstances.

We used the one-sample t-test to compare our population anxiety levels with those of a reference population of women aged 19 to 39 years, to see if

they differed significantly. A multivariate test (Hotelling's T-squared⁽⁹⁾) was used to assess whether mean anxiety levels differed among times of assessment. The generalised estimating equations^(10,11) for analysis of repeated measurement data was employed as the primary statistical analysis. We did not, however, include covariates in the model because patients were followed up throughout the study period. The patient profiles were therefore comparable at each time point.

RESULTS

All 111 subjects agreed to serum screening and none were lost to follow-up, but two mothers had incomplete responses to the STAI-3 questionnaire. The characteristics of the study population are shown on Table I. The mean age of 28.83 years was not unexpected as all mothers older than 35 years old were routinely offered amniocentesis at the time of the study.

A one-sample t-test was used to compare the subjects' anxiety levels with that of the reference population (S-anxiety = 36.17 and T-anxiety scores = 36.15) for working female adults aged between 19 to 39 years as a baseline comparison⁽⁸⁾. We found that there was no significant difference ($p=0.50$) in the S-anxiety between our study population and that of the reference population at the beginning of the study.

As only 109 subjects in the serum screening group had completed all the STAI questionnaires, the anxiety analysis was based on data obtained from these subjects. Table II describes the mean S- and T-anxiety scores at various times throughout the study in subjects that underwent serum screening. The multivariate test rejected the null hypothesis of no difference between the different times at which S-anxiety was assessed ($p<0.001$). The results revealed that the mothers were most anxious just before counselling (36.73) by the trained nurse-counsellor. Their anxiety levels decreased after counselling (35.5) but this decrease was not statistically significant ($p=0.34$). There was a significant decrease in their S-anxiety levels which reached their lowest level at the end of the study after the routine 20-week screening ultrasound scan results were acknowledged (30.61) compared to that of the previous time points pooled ($p<0.001$).

DISCUSSION

The fact that our subjects did not feel overly anxious at the beginning of the study before counselling compared with the reference population is hardly surprising as these mothers are young and therefore belong to the low-risk population for chromosomal

abnormalities. It has been argued that anxiety may be induced by giving parents risk information as a result of screening programmes, such as serum screening for Down syndrome or ultrasound screening. Some anecdotal reports have claimed prolonged anxiety when patients were informed about screen-positive results: 13% of mothers continued to be anxious, even after the favourable result of the amniocentesis⁽¹²⁾. Even then, anxiety is thought to be relatively short-lived⁽²⁾. The evidence suggests that information, in general, does not make people more anxious. In fact, most research evidence suggests that information will reduce anxiety. People need risk information to make informed decisions and this will often alter their decisions⁽¹³⁾.

Ill-informed mothers may accept any offered test by default, the so-called compliant behaviour. To help in her decision-making, she requires adequate counselling which provides information and opinions accurately, comprehensively and objectively in a nondirective fashion. Prenatal screening tests (including Down syndrome screening) are perceived by women as being the most effective factor in reducing the levels of fear and anxiety experienced throughout pregnancy⁽⁷⁾. Studies have emphasised the need for health professionals to ensure that parents make informed decisions about having screening and diagnostic tests. Failure to meet these requirements has led to uninformed decision-making, raised anxiety and false reassurance⁽¹⁴⁾.

Anxiety levels may not have significantly fallen after counselling due to the fact that the subjects realised that they were at low risk of having a Down syndrome baby, and that the risk of requiring an amniocentesis was low. They were, therefore, not unduly worried. In contrast, data from a concurrent study in our hospital showed that counselling did significantly reduce anxiety levels in mothers that were referred for amniocentesis⁽¹⁵⁾. These mothers were deemed at higher risk of having Down syndrome babies and were subsequently significantly more anxious before counselling, compared with the reference population.

A previous study on older mothers⁽¹⁶⁾ showed that the quality of counselling did not affect the patient's decision on whether to proceed with amniocentesis. As counselling did not influence the patient's decision, it would be consistent with our study that counselling had no significant effect on maternal anxiety. Despite having only a low risk of having a Down syndrome baby, the subjects were still aware of the small possibility and were, therefore, very relieved at the end of our study when normal serum screening and routine ultrasound scan results were acknowledged.

In conclusion, this study showed that offering serum screening for Down syndrome to younger mothers did not increase anxiety. The subjects had anxiety levels that were similar to the reference population prior to counselling for serum screening. It was also not surprising that counselling by a trained nurse-counsellor did not result in a significant decrease in anxiety levels, as these mothers were at low risk of having Down syndrome babies and did not have high anxiety levels from the outset.

Anxiety levels were at their lowest in the subjects after the serum screening and routine 20-week screening ultrasound scan results were acknowledged. They were also significantly lower compared to all other times in which anxiety was assessed. This was an expected response when receiving reassuring test results. This study should allay obstetricians' fear that offering routine serum screening for Down syndrome would unduly increase maternal anxiety in younger mothers.

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REFERENCES

1. Quagliarini D, Betti S, Brambati B, Nicolini U. Coping with serum screening for Down syndrome when the result is given as a numeric value. *Prenat Diagn* 1998; 18:816-21.
2. Marteau TM, Johnston M, Shaw RW, Michie S, Kidd J, New M. The impact of prenatal screening and diagnostic testing upon the cognitions, emotions and behaviour of pregnant women. *J Psychosom* 1989; 33:7-16.
3. Abuelo DN, Hopmann MR, Barsel-Bowers G, Goldstein A. Anxiety in women with low maternal serum alpha-fetoprotein screening results. *Prenat Diagn* 1991; 11:381-5.
4. Gekas J, Gondry J, Mazur S, Cesbron P, Thepot F. Informed consent to serum screening for Down syndrome: are women given adequate information? *Prenat Diagn* 1999; 19:1-7.
5. Elias S, Simpson JL. Genetic counselling. In: Simpson JL, Elias S, eds. *Essentials of Prenatal Diagnosis*. New York: Churchill-Livingstone, 1993; 3-13.
6. Vyas S. Screening for Down's syndrome. *Br Med J* 1994; 309:753-4.
7. Searle J. Fearing the worst – why do pregnant women feel “at risk”? *Aust N Z J Obstet Gynaecol* 1996; 36:279-86.
8. Spielberger CS, Gorsuch RL, Lushene RE. *The State Trait Anxiety Inventory*. Palo Alto: Consulting Psychologists Press, 1970.
9. Johnson RA, Wichern DW. *Applied Multivariate Statistical Analysis*. New Jersey: Prentice-Hall, 2002; 210-71.
10. Cheung YB, Khoo KS, Karlberg J, Machin D. Association between psychological symptoms in adults and growth in early life: longitudinal follow-up study. *Br Med J* 2002; 325:749-51.
11. Fayers PM, Machin D. *Quality of Life: Assessment, Analysis and Interpretation*. Chichester: Wiley, 2000.
12. Weinans MJ, Huijssoon AM, Tymstra T, Gerrits MC, Beekhuis JR, Mantingh A. How women deal with the results of serum screening for Down syndrome in the second trimester of pregnancy. *Prenat Diagn* 2000; 20:705-8.
13. Marteau TM, Cook R, Kidd J, Michie S, Johnston M, Slack J, et al. The psychological effects of false-positive results in prenatal screening for fetal abnormality: a prospective study. *Prenat Diagn* 1992; 12:205-14.
14. Marteau TM, Slack J. Psychological implications of prenatal diagnosis for patients and health professionals. In: Brock DJH, Rodeck CH, Ferguson-Smith MA, eds. *Prenatal Diagnosis and Screening*. Edinburgh: Churchill-Livingstone, 1992; 663-73.
15. Ng CCM, Lai FM, Yeo GSH. Assessment of maternal anxiety levels before and after amniocentesis. *Singapore Med J* 2004; 45:370-4.
16. Chua Y, Lai FM, Yeo GSH. Reasons for low uptake of amniocentesis in a multi-ethnic population. In: Ben-Rafael, Shoham Z, Frydman R, eds. *Second World Congress on Controversies in Obstetrics Gynaecology & Infertility Vol II Paris (France): Monduzzi Editore SpA, Sept 6-9 2001; 7-12.*