

# Assessment of maternal anxiety levels before and after amniocentesis

C C M Ng, F M Lai, G S H Yeo

## ABSTRACT

**Introduction:** To assess anxiety levels in mothers before and after undergoing amniocentesis. The secondary aim was to see how counselling by nurse-counsellors affected maternal anxiety levels.

**Methods:** A prospective study was carried out from February 2000 to August 2000 at the Kandang Kerbau Women's and Children's Hospital in Singapore. We used standard statistical analysis and Spielberger's state-trait anxiety inventory (STAI), that consisted of 40 items, to assess anxiety levels. Anxiety levels were assessed at different stages: before and after counselling; before amniocentesis and after amniocentesis; when results were disclosed; and after the routine 20-week screening ultrasound scan was acknowledged four to six weeks later. English-speaking women were recruited for the study as the STAI questionnaire has only been validated for an English-speaking population. 195 at-risk mothers (advanced maternal age, abnormal nuchal translucency on ultrasound scan, previous abnormal baby and high-risk maternal serum screening results) and patients requesting for amniocentesis between 15 to 20 weeks gestation were recruited.

**Results:** 156 mothers agreed to amniocentesis. 38 mothers declined amniocentesis. S-anxiety levels declined significantly after counselling by trained nurse-counsellors in all mothers counselled. S-anxiety levels were highest and significantly higher compared to all other times just prior to amniocentesis despite counselling. Anxiety levels were the lowest and significantly lower compared to all other times at the last assessment stage.

**Conclusion:** High level of anxiety prior to amniocentesis despite counselling is understandable due to the invasive nature of the procedure. There is no long-lasting post-procedural anxiety to the mother.

**Keywords:** amniocentesis, anxiety, Down syndrome, state-trait anxiety inventory

*Singapore Med J 2004 Vol 45(8):370-374*

## INTRODUCTION

Over the past decade, there have been tremendous advances in prenatal diagnosis. Yet, very little attention has been paid to the psychological aspect of such testing. The potential distress and worry engendered by offering and undergoing a test, and then waiting for its outcome, are often neglected. While there have been studies done to evaluate anxiety levels of women undergoing amniocentesis in overseas centres<sup>(1-3)</sup>, none have been carried out locally. It is important to quantify such concerns as amniocentesis has become a common procedure.

Amniocentesis remains the most frequently performed prenatal karyotyping procedure at the Kandang Kerbau Women's and Children's Hospital (KKWCH) to confirm or exclude chromosomal abnormalities, the most common of which is Down syndrome. The most common indication for amniocentesis is advanced maternal age. Despite the fact that over 5,508 amniocenteses were performed in Singapore in 1998 (unpublished data, Singapore National Birth Defects Registry), there has not been any formal study to assess the anxiety levels in mothers undergoing amniocentesis locally. In KKWCH all mothers who undergo amniocentesis are routinely seen and the majority are counselled by a nurse-counsellor prior to the procedure.

In a study<sup>(4)</sup> conducted over two periods between 1 February 1999 and 11 May 2000 in KKWCH, 91.5% of mothers out of the 1,791 mothers  $\geq 35$  years old who delivered at KKWCH had heard of Down syndrome. The uptake rate of amniocentesis was 43%. Fourteen percent of mothers declined amniocentesis because of the fear of procedural-associated miscarriage after an amniocentesis, and 4% did so because they feared the pain of amniocentesis. The study also revealed that the perceived quality of counselling did not affect the patient's decision and uptake rate of amniocentesis.

Department of  
Maternal-Foetal  
Medicine  
KK Women's and  
Children's Hospital  
100 Bukit  
Timah Road  
Singapore 229899

C C M Ng, MBBS,  
MMed, FRANZCOG  
Registrar

G S H Yeo, FRCOG,  
FAMS  
Chief of Obstetrics and  
Clinical Associate  
Professor

F M Lai Obstetrics  
and Gynaecology  
Camden Medical  
Centre  
1 Orchard Boulevard  
#03-05/06  
Singapore 248649

F M Lai, MMed,  
MRCOG,  
FRANZCOG  
Consultant

**Correspondence to:**  
Dr Christopher  
Ng Chee Mun  
Department of General  
Obstetrics and  
Gynaecology  
KK Women's and  
Children's Hospital  
100 Bukit Timah Road  
Singapore 229899  
Tel: (65) 6394 1019  
Fax: (65) 6298 6343  
Email: drchrisng@  
hotmail.com

Table I. Indications for amniocentesis (n=195).

Amniocentesis	AMA	Abn NT on US	Prev abn baby	FHx	High-risk MSS	Patient's request	Lost to follow-up	Total included
Agreed	133	3	6	3	3	9	1	157*
Declined	37	1	0	0	0	0	0	38
Total	170	4	6	3	3	9	1	195*

\* 1 mother who agreed to amniocentesis was subsequently lost to follow-up and so was not included in the study

Abn NT: abnormal nuchal translucency; AMA: advanced maternal age; FHx: family history; MSS: maternal serum screening; Prev abn: previous abnormal; US: ultrasound scan

This study assesses the anxiety levels in mothers before and after undergoing amniocentesis using Spielberger's state-trait anxiety inventory (STAI)<sup>(5)</sup>. We wanted to know whether counselling by a nurse-counsellor had any effect on the maternal anxiety levels. It has been a concern that provision of information during counselling may increase maternal anxiety<sup>(6)</sup>. However, these studies were methodologically weak and results from the study by Abuelo et al<sup>(3)</sup> showed that the provision of more information during counselling may reduce anxiety. Indeed, undergoing prenatal testing may serve to protect mothers against high levels of anxiety in the third trimester<sup>(2)</sup>.

## METHODS

Anxiety was assessed using STAI, which consists of 40 items: 20 designed to assess state anxiety (S-anxiety scale) and the other 20 aimed at evaluating 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 people "generally feel". As the STAI questionnaire has only been validated for English-speaking subjects, only English-speaking mothers were invited to participate in the study. The study population consisted of mothers that were referred for counselling prior to an amniocentesis.

A research assistant nurse interviewed pregnant women who were consecutively referred for counselling over the study period. Once recruited, patients were asked to complete the first STAI questionnaire (STAI-1), while waiting to see the nurse-counsellor. The research assistant filled in the mother's biodata. After the counselling, the mothers were asked to complete a second STAI questionnaire (STAI-2).

For mothers scheduled for an amniocentesis, anxiety levels were assessed using the third STAI questionnaire (STAI-3), while waiting on the day of the amniocentesis. They were informed of the karyotyping results two to three weeks later. On the day of their 20-week obstetrical screening ultrasound scan, they were requested to complete the fourth

STAI questionnaire (STAI-4). The last STAI questionnaire (STAI-5) was completed four to six weeks after the ultrasound scan, during a routine follow-up antenatal visit. For mothers who declined amniocentesis, they were asked to complete STAI-4 on the day of their 20-week obstetrical ultrasound scan and STAI-5 four to six weeks after their ultrasound scan. One mother chose to deliver in a private hospital and was subsequently lost to follow-up. Two mothers who had amniocentesis had incomplete responses to their STAI questionnaires.

STAI-1 assessed the mother's anxiety level prior to counselling by the nurse-counsellor, and STAI-2 evaluated whether the counselling had any effect on the anxiety levels. STAI-3 assessed the anxiety level on the day of amniocentesis, while STAI-4 assessed the level of anxiety after the amniocentesis results were disclosed, but before a routine 20-week obstetrical screening ultrasound scan. Finally, the mothers' anxiety levels were assessed four to six weeks after the results of amniocentesis and ultrasound scan had been acknowledged using STAI-5.

The patients' anxieties were compared with a reference population<sup>(5)</sup> at the start of our study in order to establish a baseline level. Subsequently, they served as their own controls for the rest of the study. Anxiety scores were analysed to determine whether there were significant differences. In our study, we expected to demonstrate significant fluctuations in the S-anxiety scores as these reflect how anxious the patient feels in response to various situations. The T-anxiety score generally reflects the patients' inherent anxious personalities, which should not change significantly in different situations.

We used the one-sample t-test to compare our population's anxiety levels with that of a reference population of women aged 19 to 39 years old<sup>(5)</sup> to see if they differed significantly. A multivariate test (Hotelling's T-squared)<sup>(7)</sup> was used to assess whether mean anxiety levels differed among times of assessment. The generalised estimating equations<sup>(8,9)</sup> for analysis of repeated measurement data was employed as the primary statistical analysis. We did not, however, include

**Table II. Characteristics of the two groups of mothers (n=195).**

Characteristic	Amniocentesis (n=157)	No amniocentesis (n=38)
Mean age ( in years)	36.29	36.05
Race (%)		
Chinese	133 (84.7)	21 (55.3)
Malay	16 (10.2)	14 (36.8)
Indian	5 (3.2)	1 (2.6)
Others	3 (1.9)	2 (5.3)
Religion (%)		
Catholic	2 (1.3)	1 (2.6)
Protestant	26 (16.6)	5 (13.2)
Buddhist	96 (61.1)	14 (36.8)
Muslim	15 (9.6)	14 (36.8)
Hindu	5 (3.2)	2 (5.3)
Others	13 (8.3)	2 (5.3)
Parity (%)		
0	32 (20.4)	6 (15.8)
1	40 (25.5)	8 (21.1)
2	64 (40.8)	11 (28.9)
3	16 (10.2)	11 (28.9)
≥4	5 (3.2)	2 (5.3)
Education (%)		
None	0 (0)	0 (0)
Primary	6 (3.8)	5 (13.2)
Secondary	112 (71.3)	20 (52.6)
Pre-university / Polytechnic	21 (13.4)	6 (15.8)
Tertiary	14 (8.9)	5 (13.2)
Postgraduate	4 (2.5)	2 (5.3)
Monthly income (%)		
<\$500	0 (0)	0 (0)
\$500-\$1499	3 (1.9)	1 (2.6)
\$1500-\$1999	29 (18.5)	8 (21.1)
\$2000-\$2999	56 (35.7)	16 (42.1)
\$3000-\$3999	32 (20.4)	3 (7.9)
\$4000-\$4999	14 (8.9)	3 (7.9)
>\$5000	23 (14.6)	7 (18.4)

**Table III. S- and T-anxiety scores for amniocentesis group (n=154) at various times throughout the study period\*.**

Stage	S-anxiety (Mean ± SD)	T-anxiety (Mean ± SD)
Before counselling (STAI-1)	38.66 ± 7.96	41.56 ± 6.35
After counselling (STAI-2)	37.09 ± 7.99	41.21 ± 6.25
Before amnio (STAI-3)	46.84 ± 9.39	41.33 ± 6.16
After amnio / pre-US (STAI-4)	34.62 ± 5.99	40.95 ± 7.27
After amnio / US (STAI-5)	30.94 ± 5.33	40.86 ± 6.51

\* From the initial 157 mothers, two mothers had incomplete responses and 1 mother was transferred to a private hospital after counselling.

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

**Table IV. S- and T-anxiety scores for mothers that declined amniocentesis (n=37) at various times throughout the study period\*.**

Stage	S-anxiety (Mean ± SD)	T-anxiety (Mean ± SD)
Before counselling (STAI-1)	37.59 ± 8.46	40.27 ± 7.54
After counselling (STAI-2)	35.22 ± 7.94	39.30 ± 7.92
Pre-US (STAI-4)	35.14 ± 8.03	39.35 ± 8.34
After US (STAI-5)	29.65 ± 5.95	39.00 ± 8.34

\* From the initial 38 mothers, one mother had incomplete responses.

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

covariates in the model because patients were followed up throughout the study period. The patient profiles were therefore comparable at each time point.

## RESULTS

The indications for amniocentesis are shown in Table I. Among these mothers, 170 mothers were referred for advanced maternal age indication. Of the remaining 25 mothers, their indications included an abnormal nuchal translucency ultrasound scan, previous chromosomally-abnormal pregnancy, a family history of foetal anomaly, a positive serum screening (high risk) result and patient's request. Table I showed that the vast majority of mothers who declined amniocentesis were from the advanced age group.

A summary of the characteristics of the 195 pregnant mothers referred for amniocentesis is shown in Table II. It shows the mother's characteristics in two groups, namely: mothers who underwent amniocentesis and mothers who declined amniocentesis after counselling. In the group that declined amniocentesis, there were proportionately more Malays, mothers with lower educational level and mothers belonging to the lower income group, consistent with a local study published<sup>(4)</sup>.

The mean STAI S-anxiety scores before counselling (STAI-1) in the group (n=157) that agreed to amniocentesis was 38.74. In the group that declined amniocentesis (n=38), the mean score was 37.71. This was compared with the reference population's mean S-anxiety (36.17) for working female adults aged between 19 and 39 years<sup>(5)</sup>. Using the one-sample t-test to compare our population anxiety levels with that of the reference population, the amniocentesis group had significantly higher ( $p<0.001$ ) S-anxiety score, whereas the group that declined amniocentesis had no significant rise in their anxiety levels ( $p=0.264$ ).

The mean S- and T-anxiety scores at various times throughout the study in both groups are listed in Tables III and IV. The multivariate test rejected the null hypothesis of no difference between the mean S-anxiety scores assessed at different times ( $p<0.001$ ). There was no significant change in the T-anxiety scores over time ( $p=0.217$  and  $p=0.174$ ) respectively.

In mothers who eventually underwent amniocentesis, there was a significant fall ( $p=0.001$ ) in their S-anxiety scores after counselling, compared with their pre-counselling baseline scores (Table III). In mothers who declined amniocentesis (Table IV), their pre- and post-counselling S-anxiety scores showed a significant fall after counselling by the nurse-counsellor ( $p=0.04$ ). There was a significant rise S-anxiety levels of the 156 mothers who agreed to amniocentesis just prior to the procedure, compared with their baseline

pre-counselling anxiety levels, despite pre-amniocentesis counselling by trained nurse-counsellors ( $p < 0.001$ ). This anxiety (46.84) was also significantly higher than at all other times pooled ( $p < 0.001$ ).

The mothers had a significant fall in their S-anxiety levels after amniocentesis. Their pre-ultrasound scan S-anxiety levels were less than their pre-amniocentesis levels ( $p < 0.001$ ). At the end of our study, the mothers were reviewed four to six weeks after their amniocentesis and ultrasound scan results had been revealed to them. Their S-anxiety levels were found to be the lowest at this time and this was significantly lower than that at their pre-counselling and post-counselling levels pooled ( $p < 0.001$ ).

## DISCUSSION

The 38 mothers who declined amniocentesis were not significantly more anxious before counselling than the reference population. They were either not in favour of amniocentesis initially or thought that their risk of having a Down syndrome child was low and were, therefore, not unduly concerned about the prospects of amniocentesis and its outcome. This is contrary to the anxiety levels displayed by mothers that agreed to amniocentesis. Their raised anxiety might be because of their perceived increased risk of having a Down syndrome child as well as being aware of the invasive nature of such a procedure. The fact that both groups displayed significant falls in anxiety levels after counselling emphasises not only the importance of providing good counselling and information to mothers so that informed decisions can be made, but also in relieving their anxiety levels<sup>(10)</sup>.

The evidence suggests that giving patient's risk information does not make people more anxious. This study, together with most research evidence, suggests that information does reduce anxiety. People need risk information to make informed decisions and this will often alter their decisions<sup>(10)</sup>. Ill-informed mothers may accept any offered test by default, so-called compliant behaviour. To help a mother in making her decision, she requires adequate counselling that provides information accurately, comprehensively and objectively in a non-directive fashion<sup>(11)</sup>.

The majority of the 156 mothers who agreed to an amniocentesis were aware of the invasive nature of the procedure and the complications that could arise from it. They were also informed of their risk of having a Down syndrome baby. The significant rise in their S-anxiety levels just prior to amniocentesis, compared with their baseline pre-counselling anxiety levels, despite pre-amniocentesis counselling by

trained nurse-counsellors, is understandable and not unexpected. Pre-ultrasound scan S-anxiety levels were less than pre-amniocentesis levels. This could be due to the fact that ultrasound scans, being non-invasive in nature, were perceived by mothers to be associated with less risk compared with amniocentesis. It could also be because all women were aware of their normal amniocentesis results by then. Mothers were least anxious when amniocentesis and ultrasound scan results were revealed. This could be attributed to the relief that these mothers felt after acknowledging their normal results.

In conclusion, more women are delaying starting their families until an older age in Singapore. This translates into proportionately more pregnant women greater than 35 years old<sup>(12)</sup> and, perhaps, an increasing number of women being offered amniocentesis. It is important to understand the impact on maternal anxiety levels when offering amniocentesis to our pregnant mothers. We were able to demonstrate that a raised anxiety level was clearly associated with amniocentesis, and that this was at its highest level just prior to the procedure. This was despite careful counselling by a trained nurse-counsellor, which reduced anxiety levels significantly immediately after counselling. Anxiety levels were lowest after normal amniocentesis and screening ultrasound scan results were known in the amniocentesis group.

Patient autonomy is a basic fundamental component of ethical medical practice. We hope that the results from this study will contribute towards greater understanding in offering prenatal procedures and counselling services to mothers. 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<sup>(10)</sup>.

## ACKNOWLEDGEMENTS

We would like to thank Dr Cheung Yin Bun (statistician, National Cancer Centre) for his invaluable assistance in statistical analysis and the KKH Research Fund RAU/027/1999 for supporting our study. We would also like to thank Dr Chua Yang for her help in proof-reading the article.

## 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 Res* 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. 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.*
5. Spielberger CS, Gorsuch RL, Lushene RE. *The State Trait Anxiety Inventory*. Palo Alto: Consulting Psychologists Press, 1970.
6. 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.
7. Johnson RA, Wichern DW. *Applied Multivariate Statistical Analysis*. New Jersey: Prentice-Hall, 2002; 210-71.
8. 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.
9. Fayers PM, Machin D. *Quality of Life: Assessment, Analysis and Interpretation*. Chichester: Wiley, 2000.
10. 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.
11. 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.
12. Immigration and Registration, Singapore. *Report on Registration of Births and Deaths 1998*. Singapore: Registry of Births and Deaths, 1998.

**1<sup>ST</sup> SINGHEALTH SCIENTIFIC MEETING,  
15 -17 OCTOBER 2004  
SHANGRI-LA HOTEL, SINGAPORE**



SingHealth is the largest provider of healthcare services in Singapore, with a proud stable of 3 hospitals – Changi General Hospital, KK Women’s and Children’s Hospital and Singapore General Hospital; 5 National Specialist Centres – National Cancer Centre Singapore, National Dental Centre, National Heart Centre, National Neuroscience Institute and the Singapore National Eye Centre – plus a primary healthcare provider group in SingHealth Polyclinics. Each has diligently built up a strong tradition of Medical Conferences through the years, and it is fitting that we now unleash the synergistic potential of each of these individual Meetings into a combined meeting that will allow greater cross-sharing of new treatment modalities, clinical practice and service quality.

At this inaugural combined meeting, we hope to be able to harness the richness and diversity of our medical talent, and this is reflected in our theme: *Medicine and Quality – from Science to Practise*. The Meeting will include sharing of Basic Science, Service Quality and Clinical Practise, including principles of evidence-based medicine.

Highlights of the Meeting include a keynote address by our strategic partner, Stanford University, and a sharing of Patient Safety efforts and learnings. The committee is working hard to ensure a vibrant and robust programme over this special weekend. It will offer a combination of plenary lectures and symposia.

This synergistic effort is open to all medical practitioners in Singapore and the region, as SingHealth forwards a collaborative stance in continuing to develop leading edge healthcare for Singaporeans, and beyond.

*For more information, please contact Ms Jocelyn Fan at SGH PGMI on email: [gtefcy@sgh.com.sg](mailto:gtefcy@sgh.com.sg)*

Members of the SingHealth Group

