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Anxiety and depression among pregnant women subjected to ultrasonographic detection of structural fetal anomalies in a public tertiary hospital

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Abstract:

BACKGROUND: Anxiety and depression are prevalent during pregnancy. There is significant evidence that antenatal anxiety and depression are risk factors for adverse maternal and neonatal outcomes.

OBJECTIVE: This study aims to determine the prevalence of anxiety and depression among pregnant women who undergo ultrasonographic detection of structural fetal anomalies in the Department of Maternal and Fetal Medicine of University of the Philippines–Philippine General Hospital, Manila, Philippines, for a 13-month period.

METHODS: The study utilized a comparative cross-sectional study design comparing those who underwent congenital anomaly scan (CAS) with those who just underwent routine biometry. There were 177 research respondents for each group. The Filipino version of the Hospital Anxiety and Depression Scale (HADS-P) was used. The psychiatric interview was based on the 5th edition of the Diagnostic and Statistical Manual of Mental Disorders (DSM V) particularly on the Major Depressive DIsorder and the Generalized Anxiety Disorder.

RESULTS: The results showed that the mean pre-diagnostics anxiety score of women who underwent CAS was significantly higher than the mean pre-diagnostics anxiety score of women who had biometry. The mean post-diagnostics depression score of women who underwent CAS was significantly higher than the mean post-diagnostics depression score of women who had biometry. However, all pregnant women had normal HADS-P score before and after CAS and biometry. Psychiatric evaluation showed that none was diagnosed to have generalized anxiety disorder or major depression in the conduct of the diagnostic tests.

CONCLUSION: This study indicates that generalized anxiety and depression among pregnant patients subjected to routine biometry and congenital scan were not problems in this tertiary hospital. Knowledge of CAS and awareness of risk factors for congenital anomalies are important for providing care and counseling pregnant women.

Keywords:

Anxiety, depression, Hospital Anxiety and Depression Scale

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Introduction

Prenatal ultrasonography is a common procedure in many countries. It is an accurate procedure for determining gestational age, fetal cardiac activity, number of fetuses, and placental location. In addition, many congenital structural

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anomalies and significant abnormalities in fetal growth can be identified.[1]

Congenital anomalies are also known as birth defects, congenital disorders, or congenital malformations. It can be structural or functional anomalies that occur during intrauterine life that can be identified prenatally, at birth, or later in life.[1]

The objectives of the routine fetal anomaly scan at 18–22 weeks are to provide reassurance that the fetus has no identifiable structural anomalies, to identify nonviable abnormalities and those associated with high morbidity and long-term handicap, fetal conditions with the potential for intrauterine therapy, fetal conditions that will require immediate postnatal investigation and/or treatment and to provide help for the mothers in planning pregnancy, monitoring, and preparing for childbirth and postnatal care.[1]

All pregnancies carry a baseline risk of a birth defect. However, it is difficult to determine the precise incidence of congenital anomalies because of variation of skills of solonogists and ultrasound machines. Accurate documentation depends on age of examination (prenatal period, newborn period, or infancy or later), experience of the observer, definition of an anomaly (major, minor), type of examination (body surface, extensive examination including internal organs), ethnic, geographic and social variations.[2]

Patients at risk for having congenital anomalies are the following: advanced maternal age because of an increased incidence of aneuploidy, family history of genetic disorder, ethnic background (certain ethnic groups have an increased incidence of specific disorders, such as sickle cell disease in blacks, Tay-Sachs disease in Ashkenazi Jews, Thalassemia in Asians, and persons of Mediterranean descent) and teratogen exposures.[2] A teratogen is any agent that can induce or increase the incidence of a congenital malformation. Potential teratogens include drugs or chemicals, infectious agents, radiation, or other toxic substances.

Fetal congenital anomalies are categorized as major or minor anomaly.[2] A major anomaly is one with medical, surgical, or cosmetic importance and with impact on morbidity and mortality. A minor anomaly is one that does not have serious surgical, medical, or cosmetic significance and does not affect normal life expectancy or lifestyle. However, this classification is subjective and arbitrary.

After a positive congenital anomaly scan (CAS) where a fetal malformation is recognized, future mothers raise a number of questions which usually include the following: cause of the congenital defect, sonographic accuracy for diagnosing this condition, chance that the ultrasound diagnosis could be in error, likelihood of perinatal death, long term handicap or mental retardation, procedures performed to correct the defect or improve the outcome, mode and time of delivery and accurate risk of a similar abnormality affecting future pregnancies.

At then UP-PGH Maternal and Fetal Medicine Division, a CAS is performed for the following indications: maternal age (>35 years old), diabetes mellitus, thyroid disorders, systemic lupus erythematosus, multiple gestation, anhydramnios, oligohydramnios, xray exposure during the first trimester, intake of teratogenic drugs during the first trimester, intrauterine growth restriction, maternal infectious disease, antiphospholipid antibody syndrome, alcohol intake or smoking in pregnancy, Mullerian anomalies, maternal and paternal congenital anomalies, history of a previous pregnancy with congenital anomaly, poor obstetric history for fetal death in utero, poor obstetric history for neonatal death, recurrent pregnancy loss, incidental finding of anomaly (present pregnancy), chemotherapy during pregnancy, history of primary or secondary infertility, poor obstetric history for preterm delivery and seizure disorder. A provisional congenital scan is done initially by the fellow in training followed by a CAS confirmation done by at least one of the consultant perinatologists. Patients are then informed and counseled of the result after each scan. Those with positive results are counseled and immediately referred to neonatology, pediatric surgery, pediatric cardiology, neurosurgery, or medical genetics as needed. Based on the fetal congenital anomaly noted, the patient is then classified to whether she would be a perinatology service or a general service admission depending on the severity of the anomaly and further specialized management needed. The women with a fetal anomaly will then receive close maternal and fetal follow up throughout the pregnancy.

To the authors' knowledge, in the Philippines, there is no study yet to determine the prevalence of anxiety and depression in pregnant women subjected to ultrasonographic detection of structural fetal anomalies. These data are important to help the clinicians and perinatologists in counseling patients before and after doing the CAS.

Significance of the study

With the results of the study, policy recommendations will be drawn on how to introduce babies with fetal congenital anomalies to their parents. The study promotes mental health. One of the aims of the Mental Health Bill (HouseBill 5347, Senate Bill 2910) of the Philippines which was approved last May 2, 2017, is to incorporate mental health services into the Philippine national health care and to provide accessible mental

healthcare especially to the impoverished and the high risk. The data from this study will help increase our awareness on the impact of a positive congenital anomaly on the psychological aspect of pregnant patients. Recognizing this problem would help the physician manage the patient holistically.

Objectives

General objectives

This study aims to look into the presence or absence and degree of anxiety and depression among pregnant women who underwent ultrasonographic detection of structural fetal anomalies in the Division of Maternal and Fetal Medicine of University of the Philippines–Philippine General Hospital, Manila, Philippines for a 13-month period.

Specific objectives

Specifically, this study aims:

1. To determine the sociodemographic and psychosocial profiles of patients recommended for ultrasonographic detection of structural fetal anomalies or CAS (CAS group), and those who undergo routine ultrasound biometry (control group) according to the following variables:
   - 1.1. Maternal age
   - 1.2. Civil status
   - 1.3. Highest educational attainment
   - 1.4. Gravidity and parity
   - 1.5. Indication for CAS
   - 1.6. Age of gestation (AOG)
   - 1.7. Employment status
   - 1.8. Average monthly income
   - 1.9. History of medical illness
2. To determine the mean anxiety and depression scores of the CAS group before the performance of CAS based on the HADS-P
3. To determine the mean anxiety and depression scores of the control group before the performance of routine ultrasound biometry based on the HADS.HADS-P for Pilipinos
4. To determine if there is significant difference between the following:
   - 4.1 Pre-CAS HADS-P mean score of the CAS group and the preroutine ultrasound biometry HADS-P mean score of the control group
   - 4.2 Post-CAS HADS-P mean score of the CAS group and the postroutine ultrasound biometry HADS-P mean score of the control group
   - 4.3 Pre-CAS HADS-P mean score and post-CAS HADS-P mean score of the CAS group
   - 4.4 Preroutine ultrasound biometry HADS-P mean score and postroutine ultrasound biometry HADS-P mean score of the control group
   - 4.5 Pre-CAS HADS-P mean score and post-CAS HADS-P mean score of CAS group patients who are positive for structural fetal anomalies
   - 4.6 Pre-CAS HADS-P mean score and post-CAS HADS-P mean score of CAS group patients who are negative for structural fetal anomalies
   - 4.7 Post-CAS HADS-P mean scores of CAS group patients who are positive for structural fetal anomalies and those who are negative.

Review of Literature

Screening for congenital abnormalities has become a routine part of pregnancy care in the western countries. Normal human development is hugely complex and while majority of babies are born without birth defects, the unfortunate reality is that there is always a risk of abnormal development, regardless of a mother's or father's age, family or personal history, or lifestyle.

Congenital abnormalities and birth defects affect 2%–3% of all pregnancies, with most of these being minor.[3] A small minority of babies have major birth defects. Most geneticists quote a figure of 3%–4% for major congenital anomalies.[2] Although some congenital conditions can be inherited, the vast majority of birth defects are random events that affect people who had thought they were low risk. Ultrasound scanning as well as blood tests has been used for many years been used to assess the risk of a baby being affected by genetic conditions.

Although foreknowledge cannot alter the fact that a baby has a congenital abnormality, parental preparation is an important aspect of prenatal diagnosis. Failure of this preparation increases the stress for the parents, family and caregivers. This can, in extreme circumstances, lead to maternal (and paternal) rejection of the child, with the attendant long-term psychological morbidity.[1]

Ultrasound screening for fetal structural abnormalities is generally recommended at 18–22 weeks of gestational age.[1,4] Earlier than 18 weeks, image resolution of the developing organs are not ideal for examination. Imaging at 24 weeks onward may be limited by the shadowing of the fetal parts over other fetal parts. The accuracy in detecting malformations by ultrasound, however, shows great variability among centers and operators.

The American College of Obstetricians and Gynecologists recommends that clinicians screen pregnant patients at least once during the perinatal period for depression and anxiety symptoms using a standardized, validated tool.[5] Although screening is important for detecting perinatal depression, screening by itself is not enough to improve clinical outcomes and must be combined with appropriate follow-up and treatment when indicated; clinical staff in obstetrics and gynecology practices should be prepared to initiate medical therapy, refer

patients to appropriate behavioral health resources when indicated, or both.

Antenatal depression, also known as prenatal depression, is a form of clinical depression during pregnancy, and can be a precursor to postpartum depression if not properly treated.[6] It is estimated that 7% to 20% of pregnant women are affected by this condition.[6] Research suggests that anxiety and depression are prevalent during pregnancy. Estimates of prevalence of anxiety and depression during pregnancy vary according to the criteria used, variable methodologies and population characteristics. Anxiety is poorly recognized by clinicians, so should be actively sought. Depression is common during pregnancy and the use of antidepressants has increased at a steady rate over the past 20 years.[7]

Any form of prenatal stress felt by the mother can have negative effects on various aspects of fetal development, which can cause harm to the mother and child. Antenatal depression is often caused by the stress and worry that pregnancy can bring, only at a more severe level. Other risk factors include unplanned pregnancy, difficulty becoming pregnant, history of abuse, and economic or family situations.

There is significant evidence that antenatal depression are risk factors for adverse neonatal outcomes for mothers and children. In particular antenatal anxiety and depression are associated with preterm birth[8] and have adverse implications for fetal neurodevelopment.[9] Antenatal anxiety and depression are risk factors for postnatal depression.[10]

Commonly, symptoms involve how the patient views herself, how she feels about going through such a life changing event, the restrictions on the mother's lifestyle that motherhood will place, or how the partner or family feel about the baby. Pregnancy places significant strain on a woman's body, so some stress, mood swings, sadness, irritability, pain, and memory changes are to be expected. Antenatal depression can be extremely dangerous for the health of the mother, and the baby, if not properly treated.

The prevalence of anxiety and depression disorders among antenatal mothers using diagnostic clinical interview were 9.1% and 8.6%, respectively.[11] Factors associated with antenatal anxiety were marital status (being unmarried), positive history of mental illness, gestational age (<20 weeks), unplanned pregnancy and depressive comorbidity.[11]

In a study by Kassen *et al*., pregnant women with fetal anomalies identified in the second trimester initially had high psychological stress levels; however, during pregnancy, their level of stress decreased compared to women with normal ultrasound examinations.[12] In women with a normal pregnancy, psychological stress levels were relatively stable and remained low through the last half of gestation, although large individual differences were found. Stress levels did not increase toward the end of pregnancy (36 weeks gestation) in either of the groups.[12]

HADS was devised 30 years ago by Zigmond and Snaith to measure anxiety and depression in a general medical population of patients.[13] It has become a popular tool, for clinical practice and research. The advantage of the HADS score is its simplicity, speed and ease of use. HADS does not include all of the diagnostic criteria of depression (Diagnostic and Statistical Manual of Mental Disorders, Fourth/Fifth Edition [DSM IV/V]) or all those required by the Health and Work Development Unit (HWDU) National Depression and Long Term Sickness Absence Screening Audit. For this, additional questions on appetite, sleep and self-harm/suicidal thoughts have to be asked. A risk assessment for self-harm or suicide should of course be carried out in appropriate cases. The questionnaire consists of seven questions for anxiety and seven questions for depression. HADS questionnaire has been validated in many languages, countries and settings including general practice and community settings.[14] The translation into Filipino was initiated by Pfizer Pharmaceuticals for clinical trial use. It has been translated to Filipino by 2 local translators and, a lay person from the Filipino Institute of Translators and a clinician. It is useful for initial diagnosis and to track progression (or resolution) of psychological symptoms.[13] HADS-P is the validated Filipino language version of HADS. De Guzman[15] in her cross-sectional study validated the HADS for Filipinos among 710 medically ill inpatients at the University of the Philippines– Philippine General Hospital, with the objective of determining the prevalence of anxiety and depression and to determine an optimal cutoff score for Filipinos using the receiver operative characteristic curve. The validity of the HADS screening test was assessed through consideration of its sensitivity and specificity compared to a formal psychiatric interview. In the study of De Guzman,[15] the prevalence of depression and/or anxiety is higher among those who are younger, married, with lower educational levels, and those with a medical diagnosis. The HADS cutoff score associated with a high sensitivity was recommended to be used. A HADS score >8 had a sensitivity of 91%, specificity of 59%, and a PPV of 61% for detecting anxiety or depression; while a HADS-P of >11 had a sensitivity of 75%, specificity of 70%, and PPV of 75%. She concluded that this HADS-P is a reliable, valid and practical screening tool for clinicians toward the diagnosis of depression and anxiety. Back in the 1970s, a standardized psychiatric interview was used in community surveys antedating HADS.[16]

Methodology

Research design

This study employed the comparative cross-sectional study design.

Population and sampling

The respondents were patients at the outpatient clinic of the hospital. They were identified from the official ultrasound logbook of the Division.

The respondents were all outpatient charity pregnant women who were scheduled for ultrasound at the Section of Maternal and Fetal Medicine of University of the Philippines–Philippine General Hospital, Manila, Philippines, from September to October 2018. The study participants were grouped into 2: (1) CAS (study group) and (2) routine biometry (control group). The subjects were identified from the official ultrasound logbook of the Department of Maternal and Fetal Medicine of University of the Philippines–Philippine General Hospital. Sample size computation was done and is specified below.

The sample size was calculated based on the study of Ariff Fadzil *et al*.[11] In this study, the mean HADS score *Risk factors for depression and anxiety among pregnant women in Hospital Tuanku Bainun, Ipoh, Malaysia*, the mean HADS score of antenatal mothers who attended the Outpatient Department of Hospital Tuanku Bainun is 8.75 with a standard deviation of 5.15 with α =0.01 (1–0.99) and z = 2.58 and using the formula $n = [(z \times \sigma)/E]^2$, n = 176.5444 and to be 99% confident that the estimate is within 1 point of the true mean HADS score, the researcher will need at least a sample of 177 scores measured from patients, i.e., at least 177 research respondents for each group (CAS group and control group) are needed for this study.

Inclusion criteria

1. Antenatal women aged 18 and above with indications for ultrasonographic detection of structural fetal anomalies or CAS according to the UP-PGH protocol
2. Antenatal women aged 18 years and above who are to undergo routine ultrasound biometry
3. Those who are able to read and write, able to understand either Filipino/English
4. Those with informed consent
5. Those who will answer the HADS-P tool twice, i.e. both before and after CAS regardless of the results.

Exclusion criteria

1. Those with known psychiatric disorders regardless of the type and neurodevelopmental retardation
2. Those who already underwent CAS for this pregnancy.

Research instrument

The Hospital Anxiety and Depression Scale

The HADS is used to measure anxiety and depression in a general medical population of patients.[17] It assesses both anxiety and depression, which commonly coexist.[18] Anxiety is poorly recognized by clinicians, therefore must be actively sought.[19] Anxiety often precedes depression in response to stressors. This would be missed using a depression only questionnaire such as the Patient Health Questionnaire (PHQ9). HADS focuses on non-physical symptoms so that it can be used to diagnose depression in people with significant physical ill health. It must be noted, however, that HADS does not include all of the diagnostic criteria of depression (DSM IV/V) or all those required by the Health and Work Development Unit (HWDU) National Depression and Long Term Sickness Absence Screening Audit.[20]

The questionnaire is comprised of seven questions for anxiety and seven questions for depression, and it usually takes 15–30 min to complete. The anxiety and depression questions are interspersed within the questionnaire. However, each is scored separately. Anxiety covers items 2, 4, 6, 8, 11, 12 and 14 while Depression covers 1, 3, 5, 7, 9, 10, and 13. Scoring is through the scale: Yes Definitely, Yes Sometimes, No not much and No not at all, corresponding to 3, 2, 1, and 0 points, respectively. It should be noted that for items 7 and 10, the scoring is reversed. Scores were interpreted using the values in Table 1.

For both depression and anxiety, scores of <7 indicate noncases (normal).

The HADS questionnaire has been validated in many languages, countries such as the Philippines, and settings including general practice and community settings.[14,15,21] It is one of the National Institutes of Health and Care Excellence recommended tools for diagnosis of depression and anxiety.[20]

Data collection procedures

Preliminary preparation

A transmittal letter was sent to the medical director of University of the Philippines–Philippine General Hospital and the Chief of the Division of Maternal and Fetal Medicine since the researcher was a trainee in the said hospital. This was done in order to obtain permission to conduct the study. The respondents of this study included all patients who satisfy the inclusion criteria.

Prior to the conduct of the study, this paper was submitted to the University of the Philippines-Manila Research Ethics Board (UPMREB) PGH review panel for review. The review determined whether the different assessment points specified by the committee

Table 1: The HADS Scoring Scale

Cumulative score	Degree of severity
8–10	Mild
11–14	Moderate
15–21	Severe

have been appropriately addressed by the study protocol. Any comments from the reviewers were taken into consideration, and recommended actions were performed before the study commences.

Data collection proper

A trained research assistant did the patient recruitment according to the selection criteria as well as explain to the patient to get her consent to participate in the study. He was also in charge of explaining the risk and benefits of the different ultrasound procedures to each of the groups prior to the preprocedure testing. Participants were all the pregnant women scheduled for ultrasound listed from the official ultrasound logbook which contains the daily schedule for CAS and routine biometry ultrasound. These procedures were done on a daily basis. Patients come in for any of the aforementioned procedures based on their assigned schedules. Sampling stopped once desired size was reached for each group. Once a patient agreed to participate in the study, a Consent to Participate Form was given for signing which meant she fully understood the terms and conditions as they have been explained to her. All the respondents were given ample time to read and sign the consent to participate form. The research assistant conducted the interview on these participants using the data collection form for psychosocial demographic profiling, as well as facilitate the answering of the HADS-P questionnaire which took about 15–30 minutes to answer. All forms, including the identity of the respondents were treated as confidential.

Psychiatric interview was done by a psychiatry resident, a coauthor of this study, who was blinded to the questionnaire responses and HADS-P scores. The psychiatric interview used the DSM V for Major Depressive Disorder and Generalized Anxiety Disorder.

After the pre-procedure psychiatric interview and HADS-P assessment, the Maternal and Fetal Medicine fellow and later confirmed by a faculty performed the scheduled ultrasound procedure, either CAS or routine biometry. Those who were confirmed to be positive for fetal anomalies underwent counseling by the perinatology fellow and a fellow in neonatology, pediatric surgery, pediatric cardiology, neurosurgery, or medical genetics were also consulted whenever applicable. Those who were confirmed to be positive for fetal anomalies underwent counseling by the Maternal And Fetal Medicine fellow and a fellow in neonatology. Pediatric surgery, pediatric cardiology, neurosurgery, and medical genetics were also consulted whenever applicable. A post-procedure HADS-P assessment by the research assistant and psychiatric interview were done right after the ultrasound scan. HADS-P and psychiatric interview result were revealed thereafter by the psychiatry resident. If a patient was diagnosed to have anxiety and depression, she was referred to the Outpatient Psychiatry Department for further assessment and/or treatment. The primary investigator facilitated their referral to the Medical Social Service. Therefore, no additional expense was incurred by the patient on the consultation. The study provided better understanding of anxiety and depression among pregnant patients which will be the basis for future management policies.

The primary physicians of patients diagnosed to have clinical depression and/or anxiety were informed through written progress notes in the outpatient records. They were referred to the Department of Psychiatry and Behavioral Medicine for co-management. Patients who requested to withdraw their participation were allowed to do so without sanctions. The participation of the respondents was fully voluntary and highly confidential. It was only the Psychiatry resident and the principal investigator (Maternal and Fetal Medicine fellow) who knew the identity of the respondents and under no circumstances were their names disclosed. Their answers were treated with utmost respect. All the data gathered from the respondents were regarded as highly confidential and were treated with utmost confidentiality. Only the researcher had sole access to the data. All answered questionnaires were planned to be shredded 5 years after completion of the study.

Data analysis procedure and statistical treatment

Descriptive statistics such as mean, SE mean, standard deviation (SD), minimum and maximum values, median, were reported to describe the variables under socioclinical and psychosocial characteristics of patients recommended for ultrasonographic detection of structural fetal anomalies or CAS (CAS group), and those underwent routine ultrasound biometry (control group) (routine biometry group) such as: maternal age; gravidity and parity; AOG, etc. upon diagnosis.

The same was used to present the depression and anxiety scores based on the HADS-P. Frequency distribution and percentage were used to present the data for civil status, highest educational attainment, indication for CAS, and final diagnosis for congenital anomaly.

Paired samples *t*-test was used to test if there is significant difference between the pre-CAS and post-CAS the anxiety and depression scores of all patients in CAS group, and those in the routine biometry group; pre-CAS and post-CAS anxiety and depression scores of patients

who are negative for structural fetal anomalies; pre-CAS and post-CAS anxiety and depression scores of patients who were positive for structural fetal anomalies.

Independent samples *t*-test was used to test if there was significant difference between post-CAS anxiety and depression scores of patients who were positive for structural fetal anomalies and the post-CAS scores of those with negative results. Minitab was used for both tests in which results were expressed as mean ± SD in a table and hypotheses were tested at 0.05 level of significance. Minitab, a statistical software package was used in the statistical computations and analysis of data. The data were entered with Microsoft Excel Spreadsheet and were analyzed with Minitab version 16.0 for Microsoft Windows 10.

Ethical considerations

Participation in the study was voluntary. No fee or penalty was applied if one chose not to partake in this study. Consent may be waived at any time during the study without any consequence.

The primary investigator shouldered all the expenses for the study. She did not receive any financial assistance from a company or individual believed to benefit from this study. Further, respondents' records were held in strictest confidentiality. It was assured therefore that all information collected from the study or during its course were not divulged to any individual or organization.

Patients included in the study were those who signed the written consent. Furthermore, persons involved in the study and other personal information were not included in the final manuscript. Any information about the patient had a number on it instead of their names. Only the researchers knew what their number were and their case report forms were locked with only the researchers with access to them. No identity was divulged in the final output as this paper may be published and presented in conferences. The result included aggregate information and did not have any personal identifier.

Any personal information obtained from the participants remained completely confidential and was used for the purpose of this study alone. The study monitors, auditors, UPMREB Ethics Review Panel and regulatory authorities were granted direct access to participant's medical records for purposes only of verification of clinical trial procedures and data.

Participants in the study had the right to access their own personal data and information about the security measures in the research study as long as access did not jeopardize security. Request for access to information should be in writing and should be dated and signed. Access to information may be restricted or refused for medical or other reasons based on the Health Research Act.

There was minimal risk, may it be physical, psychological, social or economic, to subjects in the study.

Results

Of the total of 367 women who satisfy the inclusion criteria, 354 agreed to participate.

A total of 354 patients underwent CAS (n = 177) or biometry (n = 177). Data of 354 patients were available for both descriptive and inferential analyses. The median age of participants was 29 years old with those at the CAS group being older (35 years) than those at the biometry group (25 years). Slightly more than half (51%) of pregnant women who had CAS belonged to the 26–35 age group while 53% of those who had biometry belonged to the younger age group of 18–25 years. None in the biometry group was more than 35 years old. In addition, about half of the participants had live-in partners (48%), less educated and finished only high school or secondary level (66%), unemployed in which majority were housewives (72%), and belonged to the low socioeconomic status with a monthly family collective income of PhP 10,000 (81%). For the two groups, the median gravidity was two pregnancies while the median parity was one. About six in every ten women who had CAS had comorbidities while only two in every ten women who had biometry had comorbidities. Among the indications of CAS, 52% were secondary to comorbidity or poor obstetric history while 44% was due to older maternal age. The median AOG was 29 weeks with majority of those who had CAS had AOG between 20 and 28 weeks (55%) while that of biometry had AOG between 29 and 42 weeks (64%). Majority of those who had CAS (85%) or those who had biometry (57%) had no baseline knowledge of the procedures. The procedures were requested mostly by residents (88%) as compared to fellows (12%) since majority were their patients. Pre- and post-sonologic psychiatric evaluation was 100% with absence of generalized anxiety and major depressive disorder for both CAS and biometry groups. Table 2 summarizes the demographic and psychosocial profile of the participants.

Of the 177 patients who underwent CAS, the most common indication is maternal age comprising 44%. Table 3 shows the top 5 indications of congenital scan during the study period.

As shown in Table 3, eleven out of 177 (5.7%) are provisional congenital scan positive. Seven were confirmed true positives and four were false positive.

The four false positive results were 2 cases of pyelectasia, 1 case of megacisterna magna and 1 case of intracardiac focus. Pre-CAS HADS-P mean score and post-CAS HADS-P mean score of CAS group patients who are positive for structural fetal anomalies were all normal.

All patients had a normal HADS-P score prior to CAS or biometry. This means that use their HADS-P scores were below seven which was interpreted as normal. Thus, none were determined to have generalized anxiety disorder or major depression prior to the conduct of the diagnostic tests. However, the mean pre-diagnostics anxiety score of women who underwent CAS was significantly higher than the mean pre-diagnostics anxiety score of women who had biometry, 4.88 versus 3.94, respectively ($P < 0.0001$). Similarly, the mean pre-diagnostics depression score of women who underwent CAS was significantly higher than the mean pre-diagnostics depression score of women who had biometry, 4.51 versus 3.84, respectively ($P < 0.0001$). The pre-diagnostics comparison of anxiety and depression scores is summarized in Table 4.

Similarly, all patients had a normal HADS-P score after CAS or biometry. Thus, none were determined to have generalized anxiety disorder or major depression post-diagnostics. However, the mean post-diagnostics anxiety score of women who underwent CAS was significantly higher than the mean post-diagnostics anxiety score of women who had biometry, 4.88 versus 3.66, respectively ($P < 0.0001$). Similarly, the mean post-diagnostics depression score of women who underwent CAS was significantly higher than the mean postdiagnostics depression score of women who had biometry, 4.64 versus 3.79, respectively ($P < 0.0001$). The post-diagnostics comparison of anxiety and depression scores is summarized in Table 5.

The pre- and postbiometry anxiety and depression scores were likewise normal. However, the mean pre-biometry anxiety score, 3.94, was significantly higher than the mean post-biometry anxiety score, 3.66 (P value = 0.0257). The mean pre-biometry depression score, 3.84, was not statistically different from the mean pre-biometry depression score, 3.79 (P value = 0.7036). Table 6 summarizes the pre- and post-biometry comparison of anxiety and depression scores of the respondents.

The pre- and post-CAS anxiety and depression scores were also normal. The mean pre-CAS anxiety score, 4.88, and the mean post-CAS anxiety score, 4.88, were not statistically different from each other (P value = 0.9518). Similarly, the mean pre-CAS depression score, 4.51, and the mean post-CAS depression score, 4.64, were not significantly different from each other (P value = 0.2247). Table 7 summarizes the pre- and post-CAS anxiety and depression scores of the respondents.

Discussion

This is a pilot study reporting the prevalence of anxiety and depression among pregnant patients subjected to CAS in the Philippine General Hospital. The prevalence of depression and anxiety with the results obtained in this study is not consistent with what has been found in literature. International studies by Mohamad *et al*.[22] reported that the prevalence of antenatal depression among women in Sabah, Malaysia was 13.8%. In a cross-sectional survey conducted by Fadzil *et al*.[11] in a hospital in Ipoh, North Malaysia, depressive symptoms was 8.6%. In a study by Roomruangwong and Epperson, they found out that women from western countries had slightly higher perinatal depression compared to the women from Asian countries.[23] Gestational age had no significant association with anxiety and depression; however, it was more frequent in the last trimester of pregnancy.[23]

According to Verbeek *et al*.,[24] low socioeconomic status (educational level, unemployment and income) and preceding negative life events both have an adverse effect on antenatal anxiety and depression. Furthermore, low socioeconomic status increases the adverse impact of prior negative life events on anxiety and depressive symptoms in pregnancy. However this does not hold true in this study.

The common individual factors associated with depression during pregnancy included younger age,[15,25] less education,[15,24,26] and suffering from medical comorbidities.[15,27] In this study, all of this factors did not cause anxiety and depression antenatally.

Depression and low rate of recovery was found to be associated with financial problems or poverty in several studies both in Asia and western countries.[28] Although pregnancy and childbirth are generally viewed as a joyful time to most families, they also put on economic burden (including increased expenses for antenatal care and delivery and expenses for a new member of the family), especially, among low-income families or nuclear families, where the husband is the only one who provides family income.

Majority of the study participants belonged to low socioeconomic status, low educational attainment and had morbidities, but their HADS-P scores showed they did not belong to those with depression and anxiety.

In interpreting the results, it is best to identify the protective factors of a person that may preclude the

onset of a depressive or anxiety disorder. One factor is the resiliency of the Filipino amidst the context of poverty.[29] Resilience is the ability to bounce back from a negative situation. What makes the Filipino resilient? Culturally, the core of Filipino society is the family and having an extended family and the Filipino man or woman is dependent on situating the individual as belonging to a family. In the study, 48% of the participants had a live in partner with which we can glean that support is available. In buffering stress, Filipino women could depend on family-level factors, such as support, cohesion and quality of communication

Table 2: Demographic and psychosocial profile of patients per diagnostic test done

Variables	CAS (*n*=177), frequency (%)	Biometry (*n*=177), frequency (%)	Total (*n*=354), frequency (%)
Maternal age, median (p25–p75)	34 (29–37)	25 (21–30)	29 (24–34)
18–25	23 (12.99)	94 (53.11)	117 (33.05)
26–35	91 (51.41)	83 (46.89)	174 (49.15)
>35	63 (35.59)	0	63 (17.80)
Civil status			
Live-in	94 (53.11)	76 (42.94)	170 (48.02)
Married	40 (22.60)	45 (25.42)	85 (24.01)
Single	43 (24.29)	56 (31.64)	99 (27.97)
Highest educational attainment			
Elementary	15 (8.47)	4 (2.26)	19 (5.37)
High school	126 (71.19)	108 (61.02)	234 (66.10)
Vocational	8 (4.52)	23 (12.99)	31 (8.76)
College	28 (15.82)	42 (23.73)	70 (19.77)
Employment status			
Employed	45 (25.42)	55 (31.07)	100 (28.25)
Housewife	132 (74.58)	122 (68.93)	254 (71.75)
Family collective monthly income	(*n*=177)	(*n*=170)	(*n*=347)
P 1000	31 (17.51)	35 (20.59)	66 (19.02)
P 10,000	146 (82.49)	135 (79.41)	281 (80.98)
Gravidity, median (p25–p75)	3 (2–4)	2 (1–3)	2 (1–3)
1	34 (19.21)	70 (39.55)	104 (29.38)
>1	143 (80.79)	107 (60.45)	250 (70.62)
Parity, median (p25–p75)	2 (1–3)	1 (0–1)	1 (0–2)
Nulliparous	38 (21.47)	77 (43.50)	115 (32.49)
≥1	139 (78.53)	100 (56.50)	239 (67.51)
History of medical illness			
None	71 (40.11)	138 (77.97)	209 (59.04)
With comorbidities	106 (59.89)	39 (22.03)	145 (40.96)
Indication for CAS			
Maternal age	78 (44.07)	-	-
Comorbid/POH	92 (51.98)	-	-
Maternal age + comorbid/POH	7 (3.95)	-	-
Age of gestation, median (p25–p75)	28 (24–31)	30 (26–34)	29 (25–33)
0–12	0	0	0
13–28	98 (55.37)	64 (36.16)	162 (45.76)
29–42	79 (44.63)	113 (63.84)	192 (54.24)
>42	0	0	0
Baseline knowledge			
No	150 (84.75)	101 (57.06)	251 (70.90)
Yes	27 (15.25)	76 (42.94)	103 (29.10)
Procedure requested by			
Fellow	8 (4.52)	33 (18.64)	41 (11.58)
Resident	169 (95.48)	144 (81.36)	313 (88.42)
Pre-psychiatric evaluation			
Negative	177 (100.00)	177 (100.00)	354 (100.00)
Post-psychiatric evaluation			
Negative	177 (100.00)	177 (100.00)	354 (100.00)

CAS: Congenital anomaly scan, POH: Poor obstetric history

among family members; resources outside family, such as neighborhood and community and individual level factors, such as intelligence (61% of the women were also high school graduates which meant that knowledge may be a protective factor) and spirituality.

Protective factors in Filipino women may also include the ability to cope with stressors. In a study by Bibera *et al*.[30] in Labangon, Cebu City on mothers dealing with financial burden of having children and balancing responsibilities, the author found that the top ranking coping mechanism was that the problem would just go away, hoped the a miracle may happen, speaking to self, concentrated on what to do next, look for someone who is a good listener, tried to look at bright side of things, talked to someone very close to, to accept sympathies and understanding, spent time by themselves, tried to make best of their situation. From the data, it may be gleaned that the ability to cope with stress varies from individuals and for this sample of Filipino mothers, they are able to maximize possible ways of helping themselves feel better despite their condition.

Prenatal ultrasonography may it be a biometry or congenital scan is a widely used non-invasive, safe procedure for prenatal screening of low as well as high risk pregnancies offering diagnostic information at any age of pregnancy and has potential benefit to both the mother and the fetus. This could be the explanation for the normal HADS-P scores before and after the CAS or biometry among these pregnant patients. In this study, none was diagnosed to have generalized anxiety disorder or major depression upon psychologic evaluation performed before and after ultrasound.

The accurate identification of congenital anomalies coupled with good prenatal counseling reduces parental anxiety and help expectant parents prepare for the birth of an affected child. The possibilities of having a malformation detected are found to be major concern of women in this study to those most, especially to who had babies with previous congenital anomalies but since pregnant mothers in this study were reassured and counseled after the result of the congenital scan whether negative or positive for gross structural anomalies for the majority of these women thus explains absence of anxiety and depression.

Although majority of the pregnant women in this study does not have enough knowledge about each specific ultrasound procedures, they knew that it is requested for the welfare of the babies by their physicians majority of which are residents.

Anxiety, and especially depression, during the postnatal period have been studied extensively; however, relative to the postnatal period, the research on these topics during the antenatal period is sparse. Thus, it remains unclear as to the extent of the issues as well as the risk factors associated with increased antenatal mental health problems for Filipino parents. Given these apparent issues, it is not surprising that there is need for further investigation in this area.

Despite the long waiting times in the hospital antenatal clinics for prenatal checkup for the pregnant mothers, it is important for us obstetricians to educate our pregnant women regarding the purpose request of such ultrasound procedures such as biometry and congenital scan as well as their expected results since majority of them does not have the knowledge why it is being requested. Adequate time for each woman to be treated as an individual in the antenatal clinic would be a beginning. Shifting the emphasis on physical health to include questions about the mother's emotional well-being is a vital part of good prenatal care. Although in this study, none of the the two groups had generalized anxiety and depression, it is still our duty as medical practitioners to offer mental health services since its been underutilized in our country.

Table 3: Top 5 Indications for congenital anomaly scan

Indication for congenital anomaly scan	*n*=177, *n* (%)
1. Maternal age (>35 years old)	78 (44)
2. Diabetes mellitus	28 (16)
3. Thyroid disorders	11 (6)
4. History of baby with congenital anomaly	10 (6)
5. Multiple gestation	8 (5)

Table 4: Pre-diagnostics comparison of anxiety and depression scores

Variables	CAS (*n*=177), *n* (%)	Biometry (*n*=177), *n* (%)	Total (*n*=354), *n* (%)	*P**
Pre-HADS score				
Normal	177 (100.00)	177 (100.00)	354 (100.00)	
Anxiety score (mean±SD)	4.88±0.86	3.94±1.35	4.41±1.22	<0.0001
Generalized anxiety				
Negative	177 (100.00)	177 (100.00)	354 (100.00)	
Depression score (mean±SD)	4.51±1.15	3.84±1.36	4.18±1.31	<0.0001
Major depression				
Negative	177 (100.00)	177 (100.00)	354 (100.00)	

*Tests were done using a independent *t*-test for normal data, under a two-tailed test of hypothesis. A $P<0.05$ is considered significant for all tests. SD: Standard deviation, CAS: Congenital anomaly scan, HADS: Hospital Anxiety and Depression Scale

Table 5: Post-diagnostics comparison of anxiety and depression scores

Variables	CAS (*n*=177), *n* (%)	Biometry (*n*=177), *n* (%)	Total (*n*=354), *n* (%)	*P**
Post-HADS score				
Normal	177 (100.00)	177 (100.00)	354 (100.00)	
Anxiety score (mean±SD)	4.88±1.05	3.66±1.53	4.27±1.45	<0.0001
Generalized anxiety				
Negative	177 (100.00)	177 (100.00)	354 (100.00)	
Depression score (mean±SD)	4.64±1.13	3.79±1.41	4.21±1.34	<0.0001
Major depression				
Negative	177 (100.00)	177 (100.00)	354 (100.00)	

*Tests were done using a independent *t*-test for normal data, under a two-tailed test of hypothesis. A *P*<0.05 is considered significant for all tests. SD: Standard deviation, CAS: Congenital anomaly scan, HADS: Hospital Anxiety and Depression Scale

Table 6: Pre- and post-biometry comparison of anxiety and depression scores

Variables	Prebiometry (*n*=177)	Postbiometry (*n*=177)	Difference (*n*=177)	*P**
Anxiety score (mean±SD)	3.94±1.35	3.66±1.53	0.28±1.64	0.0257
Depression score (mean±SD)	3.84±1.36	3.79±1.41	0.05±1.78	0.7036

*Tests were done using a paired *t*-test for normal data, under a two-tailed test of hypothesis. A *P*<0.05 is considered significant for all tests. SD: Standard deviation

Table 7: Pre- and post-congenital anomaly scan comparison of anxiety and depression scores

Variables	Pre-CAS (*n*=177)	Post-CAS (*n*=177)	Difference (*n*=177)	*P**
Anxiety score (mean±SD)	4.88±0.86	4.88±1.05	0.01±1.24	0.9518
Depression score (mean±SD)	4.51±1.15	4.64±1.13	−0.12±1.42	0.2447

*Tests were done using a paired *t*-test for normal data, under a two-tailed test of hypothesis. A *P*<0.05 is considered significant for all tests. SD: Standard deviation, CAS: Congenital anomaly scan

Limitations

This study only determines the prevalence of perinatal anxiety and depression among pregnant women subjected to CAS and routine biometry. It does not include problems in pregnancy such as difficulty becoming pregnant, history of abuse and if pregnancy is wanted or not. This study was done in pregnant women with low socioeconomic status and low educational attainment. Different results may be obtained if done in private setting. The pre- and post-anxiety depression scores were done before and after the provisional scans.

Conclusion

This study indicates that generalized anxiety and depression among pregnant patients subjected to routine biometry and congenital scan were not experienced in this tertiary hospital. Knowledge of CAS and awareness of risk factors for congenital anomalies are important for providing care and counseling pregnant women.

Recommendations

It is essential to include as one of the variables if pregnancy is unplanned/unwanted since studies show that women with unplanned pregnancy are more likely to experience depressive symptoms. It is recommended to validate HADS-P use among pregnant women since it can be used as a screening tool among pregnant women for diagnosing anxiety and depression. According to the results and limitations of the present study, the researcher recommends a similar study in a private medical care setting.

Authorship contributions

Sharon Jane P. Galagnara - Involved in the conceptualization, methodology, software, data curation, validation, formal analysis , resources, data curation , writing of the original draft, review and editing.

Valerie Tiempo-Guinto - Involved in conceptualization, methodology, validation, review and editing of the draft, visualization, supervision.

Christi Annah Valmores Hipona - Involved in conceptualization, methodology, formal analysis.

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Conflicts of interest

There are no conflicts of interest.

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