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Women's knowledge and utilization of prenatal screening tests: A Turkish study

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Women's knowledge and utilization of prenatal screening tests

Aim: The aim of the study was to determine the rate of utilization of prenatal screening tests and the factors affecting the decision to have a prenatal screening test in pregnant women in Turkey.

Background: Prenatal genetic screening as an optional service is commonly used to determine a level of risk for genetic conditions in the fetus.

Design: A quantitative cross-sectional survey.

Methods: Pregnant women (n= 274) who sought prenatal care from one hospital in Turkey were recruited and asked to complete questionnaires that were developed by the researchers. Descriptive and inferential statistics were used to analyze the data.

Results: Almost half **(**44.2) % of the women were primiparas, and the majority (97.8 %) were in the third trimester of pregnancy. Only 36.1 % of the women reported that they had prenatal screening by either the double or triple test. Women had a low level of knowledge regarding prenatal screening: the mean knowledge score was 3.43±3.21 of a possible score of 10. Having consanguineous marriage, a history of spontaneous abortion, a child with genetic disorder, multiparity, or a longer marriage duration were positively correlated with accepting a prenatal screening test.

Conclusions: This study has provided baseline data on the uptake and reasons for accepting or declining a prenatal screening in a cohort of Turkish women. There is evidence to suggest that more education is needed to improve knowledge and provide comprehensive nursing care to promote informed consent in this context.

Relevance to clinical practice: Perinatal nurses are ideally situated to inform pregnant women about prenatal screening tests to improve access to health care services and to ensure informed

decisions are made by pregnant women and their partners.

Key words: Prenatal care, screening test, pregnancy, utilisation

INTRODUCTION

Prenatal care (PNC) is crucial to improve infant health outcomes such as full-term birth and normal birth weight. The goals of PNC include risk assessment and reduction, health education, and psychological support (Dolan *et al.* 2007, Novick 2009). One of the objectives of the PNC is to identify women whose fetus is at risk for congential and inherited conditions. Therefore, genetic assessment, screening, and testing has been offered in the context of PNC for many years and in many countries (Dolan *et al.* 2007, Skirton & Barr 2010, Lewis 2011, Turkey Public Health Institute (TPHI), 2014). Because prenatal genetic screening and testing are optional services, health professions need to provide women with the necessary education about screening and diagnostic tests to enable them to make informed decisions (Skirton & Barr 2010).

Genetic testing is usually conducted on individuals when there is a known or high likelihood of risk, familial history, or predisposition for a condition. Screening constitutes programs of testing conducted on specific populations to identify risk of conditions where these are not known. Screening could be considered as a public health intervention (Andermann & Blancquaert 2010). One type of prenatal screening includes maternal serum markers assessment and ultrasound examination to determine the risk level of the fetus for congenital abnormalities and chromosomal syndromes (Shaw *et al.* 2013, Evans *et al.* 2015). Commonly, this type of prenatal screening is offered in three ways double screening, combined screening, and triple screening. The double screening involves maternal serum of pregnancy-associated plasma protein-A (PAPP-A) and free beta-human chorionic gonadotropin (fbeta-hCG) (Shaw *et al.* 2013, Evans *et al.* 2015). The combined screening includes the double screening with ultrasound examination for nuchal translucency thickness (NT) and absence and/or presence of the nasal bone (fbeta-hCG/PAPP-NT) (Shaw *et al.* 2013, Evans *et al.* 2015). The triple screening involves

maternal serum α-fetoprotein (AFP), unconjugated estriol, and human chorionic gonadotropin (hCG) (Dundar *et al.* 2011, Shaw *et al.* 2013, Evans *et al.* 2015). There have been changes in the approach to prenatal screening and diagnosis recently. Besides the double and the triple test, there are other tests available such as the quad screening (AFP/HCG/estriol/Inhibin) as well as noninvasive prenatal screening with cell-free fetal DNA (Evans *et al.* 2015). In Turkey, the Ministry of Health Antenatal Care Guide states that every women should be informed and offered the measurment of nuchal translucency thickness by ultrasonography and the combined test between 11 and 14 weeks of gestation, the maternal serum AFP and between 16 and 20 weeks of gestation, the triple/quad screening between 16 and 20 weeks of gestation (if the combined or the double test is not done), and fetal anomaly scan at around 18 and 20 weeks of gestation during antenatal routine care. These tests are free for all women in Turkey (TPHI, 2014).

Background

Over a fifty year period advances in prenatal screening for congenital abnormalities and chromosomal anomalies in particular have focused on obtaining higher sensitivity and lower false postivie rates through the use of biochemical, ultrasonography, and most recently molecular markers (Evans *et al.* 2015, Skirton & Barr 2010). Benefits of detecting abnormalities during pregnancy include enabling clinicians and families to appropriately manage the pregnancy, plan for a high-risk delivery, and arrange for specialized postnatal medical care and support if necessary (Dolan *et al.* 2007, Dundar *et al.* 2011). Other benefits include providing reassurance regarding the health of the baby, planning for palliative care, and engaging in early intervention for the fetus (Crombag, Bensing, Iedema-Kuiper, Schielen, & Visser, 2013, English & Hessler 2013, van den Berg *et al.* 2005). On the other hand, maternal serum and ultrasongraply screening

reveal risk indictors and do not confer direct diagnostic results. Therefore, false-negative and false-positive results are possible (Skirton & Barr 2010). False positive results may cause unnecessary anxiety and lead to unnecessary invasive procedures (Novick 2009, Skirton & Barr 2010). Prenatal screening can also cause parents to feel uncertain, fearful, and lead to moral dilemmas surrounding treatment decisions (Crombag, Bensing, Iedema-Kuiper, Schielen, & Visser, 2013; English & Hessler 2013, van den Berg *et al.* 2005). A key decision couples face after their baby is diagnosed with a congenital or inherited disorder is whether to continue the pregnancy. Although termination may be an option (where it is legally available), it should not be forgotten that prenatal diagnosis of a fetus with a congenital or inherited disorder gives couples who decide to continue the pregnancy an opportunity to prepare for a baby with an abnormality (Skirton & Barr 2010, Dundar *et al.* 2011; Lewis 2011; Crombag, et al., 2013; English & Hessler 2013, van den Berg *et al.* 2005).

While fetal screening and testing allows parents to have more pregnancy management choices, there is evidence that in some countries, prenatal screening tests have become a part of routine antenatal care, and individuals do not know whether they have the right to refuse or accept (Andersona & Metcalfe 2008, Skirton & Barr 2010, Lewis, 2011, Shaw *et al.* 2013). In a systematic review, Skirton and Barr (2007) established that when parents and health care professionals regarded prenatal screening as routine informed decision making does not take place. Lewis (2011) also found that many women signed the consent form to document their decision about genetic diagnostic tests but did not know why they were being tested or which test they were going to have. Women generally did not know the difference between screening and diagnostic tests, nor the implications of the results (Lewis 2011). In a seminal work, Appelbaum (2007) asserted that consent for testing requires that an individual understands information given

by health care professionals, is fully aware of the implications of the test, and can communicate their decision to the professionals involved (Appelbaum 2007). Therefore, it is necessery to give women the opportunity to ask questions that they may have, after receiving the required information related to prenatal screening tests.

Recently, research with pregnant women and their partners in making informed decision has been conducted to gain detailed insight and improve our understanding of women's complex needs with regard to prenatal screening tests (Dolan *et al.* 2007, Skirton & Barr 2010, Lewis 2011, Gitsels-vander Wal *et al.* 2014a, Gitsels vander Wal 2015b). However, knowledge is scarce about the factors effecting prenatal screening and diagnostic test utilization, and knowledge on prenatal screening tests among Turkish women. This is important to address because Turkish pregnant women cannot benefit from prenatal care if it is not tailored according to their preferences and needs. Moreover, it is important to enhance the nursing role to meet pregnant women's needs, because a nurse may play a crucial role in communicating genetic related implications to women and their families in the prenatal period, as part of the information that must be integrated for decision-making (Lewis 2011).

The aim of the study was to determine the rate of utilization of prenatal screening tests (the double and the triple test) and factors affecting the decision to have a prenatal screening test. To achieve this aim, two research questions were investigated: 1) What is the rate of utilization of prenatal screening tests among pregnant women in a Turkish health center? 2-) Which factors may influence their decisions to have prenatal screening test?

METHODS

Study design

We used a cross-sectional survey design to investigate the utilization rate for prenatal screening tests and factors affecting decision-making for the uptake of prenatal screening in a large cohort of Turkish women.

Participants and procedures

This study was conducted in Turkey in an obstetrics outpatient clinic of a research and training hospital for four months during November 2014- February 2015. The relevant University Ethics Committee (2014.134.IRB2.036) approved the study and the permission from the Public Hospital Association General Secretariat was obtained.

All pregnant women at more than 20 weeks of gestation who sought prenatal care from a single, approximately 800-bed, urban hospital during the study period were eligible for the study. Recruitment of the pregnant women took place on one day–two days a week when a research assistant (a senior nursing student) was able to attend the clinic. Upon registration, all pregnant women were informed about the study aims and methods in the waiting room by the research assistant. Approximately 320 women were approached and 35 refused to participate in the study. Women who were willing to participate in the study were asked to individually fill out the two questionnaires. It took approximately 15–20 minutes to complete the questionnaires. A total of 285 women were recruited, and 11 women did not fill in the questionnaires completely. In total, 274 pregnant women were included in the study.

Questionnaire

To collect data, a 'Participant Information Form' and a 'Knowledge Assessment Form' were used. These questionnaires were developed based on literature review conducted by the researchers.

The Participant Information Form consisted of 18 questions prepared to evaluate the demographic characteristics of the participants and their husbands/partners, and obstetric characteristics of the participants. We also asked whether the woman had a prenatal genetic screening (such as the double or the triple test), reasons for accepting or declining the test, and any unmet eductional needs in terms of prenatal genetic screening tests.

The Knowledge Assessment Form comprised 10 true statements on the double test, triple test, test timing, possible results, and further examination based on possible test results. To develop the form, a literature search was done to find the most current information on prenatal screening options (Andermann & Blancquaert 2010, Shaw *et al.* 2013, TPHI, 2014, Evans *et al.* 2015). In order to determine the general appropriateness and applicability for the form, the content validity was evaluated by three authors (KE, MS, AA), who are experts in obstetrical nursing. Women were asked to respond 'true', 'false', or 'do not know' to these statements. One point was given for each statement answered correctly, the total possible score was 10. The Cronbach's alpha statistic was used to measure internal consistency, and was calculated as .90, which shows a good level of reliability of the form (Bland & Altman 1997).

Before the study was conducted the questionnaires were pilot tested with five pregnant women who were not included in the study. Minor changes such as spelling, rewording, and adding new words to clarify the questions were made after this process.

Analyses

The SPSS for Windows (SPSS Inc., Chicago, IL, USA) software, version 21.0, was used to support the statistical analysis. The data was shown as frequency distributions in both counts and percentages. The chi square and t-test were used for statistical comparison between groups. A *p*-value of less than 0.05 was accepted as statistically significant.

RESULTS

Table 1 shows the demographic characteristics of the 274 women who participated**.** None of the women reported that they or their husbands were personally affected with a genetic disorder, but six (2.2 %) reported that they had a child with genetic disorder (abnormal heart rhythm, Down syndrom and hormone deficiency). Ten women stated that they had a family history of genetic diseases. This was an open ended question and the respondents decided whether they thought a condition was genetic; the conditions reported were those such as diabetes mellitus, mental retardation, breast cancer, familial Mediterranean fever, epilepsy, depression, and heart disease. The husbands of nine (2.9 %) women reported a family history of diabetes mellitus, heart disease, and mental retardation. In 9.9 % of women (n=27) the marriage was consanguineous.

Less than half (44.2 %) of the women were primiparas, the majority (97.8 %) were in the third trimester of pregnancy. Most women had neither a health problem during their current pregnancy (85.8 %), nor a chronic health problem before (92.3 %) the pregnancy. None had used reproductive technologies to become pregnant. Data related to the pregnancies are reported in Table 2.

Table 3 shows the women's histories of having noninvasive genetic screening tests (the triple or the double tests) of women during their current pregnancy. Only 36.1 % (n=99) of the women reported they had prenatal screening by either the double or triple test, and 21.4 % (n=21) of participants at first considered declining the test due to different reasons, but then ultimatley

decided to get tested. Of the women who had a test and would have liked to learn more about prenatal screening tests (n=32, 32.3 %), seventeen (53%) wanted more information about ' the importance of the tests and why the tests should be done' and seven (21.8%) wanted more information about 'what they will do (or what they should do) if there is a bad result'. Also, 2.5 % of women (n=7) had amniocentesis and 2.2 % (n=6) of them did not have amniocentesis although the doctor had advised them to do so.

Table 4 depicts women's level of knowledge regarding prenatal screening tests. There is a statistically significant relationship between the status of having a prenatal screening test and charateristics such as history of spontaneous abortion, parity, having a child with a genetic disorder, consanguineous marriage, and duration of marriage ($p<0.005$). Also, having a history of spontaneous abortion, having consanguineous marriage, being multiparous, and longer marriage duration were positively correlated with having a prenatal screening test (Table 5).

DISCUSSION

Recent national data show that in Turkey, not only are more women receiving antenatal care (ANC) (the proportion of women having four or more antenatal care visits is 89.9 %, compared with 55 % in 2008), but also they appear to be more aware of the importance of early ANC visits than before (Hacettepe University Institute of Population Studies, 2014). All pregnant women in Turkey should be routinely offered prenatal screening as a part of their antenatal care, and the current practice in Turkey is to offer the Double test between 11-13th weeks. Pregnant women presenting later on or declining first trimester screening are offered the triple or the quad test between 16 -20 weeks of gestation (TPHI, 2014). In this study, 36.1 % of the pregnant women had prenatal screening by either the triple or double test; these data are consistent with those derived from another Turkish study. Ergun (2007) found that 40.8% of

pregnant women had either (or both) the double or triple tests during pregnancy. Ergun (2007) also reported that 38.8% of women were not aware of which test they had. In another Turkish study Sahin and Gungor (2008) found that both perinatal screening and diognostic tests are offered as a routine prenatal care in a hospital in Istanbul. They also reported that the main admission reason to the prenatal diagnosis unit was routine referral for first and second trimester ultrasound screening (Sahin & Gungor 2008). Assuming that prenatal screening is seen as a routine part of antenatal care in Turkey, the rate of women who had screening in the current study is considered low, and therefore, it is thought that these results may be due to the participants' lack of awareness of tests they had during pregnancy. In the Netherlands, a recent nationwide study showed 23% of women had the combined test, (Gitsels-vander Wal *et al.* 2014a), but findings among Muslim women in the same country indicated a somewhat lower rate of uptake for the combined test (mean rates 20%) (Gitsels vanderWal 2015b). Crombag *et al.* (2013) determined that in the Netherlands uptake rates for Down syndrome screening are low compared with those in other Northern European countries (27% versus 61% in the United Kingdom and 90% in Denmark). These results may indicate that uptake varies widely from country to country and this may be in part due to healthcare practices and regulations related to prenatal screening and diagnostic tests as well as cultural and religious attitudes about disability and termination of pregnancy.

The goal of genetic counseling is to educate the woman and her partner about their specific levels of risk, risk reduction, and reproductive options and to help couples who are at high risk of having a fetus with a congential abnormality or genetic condition to make decisions about genetic testing (Lewis 2011, Gregg *et al.* 2013). Stefansdottir *et al.* (2010) found that 66% of pregnant women, in the first trimester of pregnancy, wanted all available information about

prenatal screening and diagnosis. Gitsels vanderWal *et al.* (2015) found that pregnant Muslim Moroccan women underlined the importance of accurate and detailed information about the test procedures and the anomalies that could be detected. Also, pregnant Muslim Moroccan women preferred counsellors to initiate discussions about moral topics and their relationship with the women's religious beliefs and values to facilitate an informed choice about whether or not to participate in the screening tests (Gitsels vanderWal *et al.* 2015b).

In our study, many women believed that they had not had sufficient information about screening tests during their pregnancies; 32.3% of pregnant women who had screening test would have liked to learn more about prenatal genetic screening tests. Therefore, it is unclear whether or not they made informed decisions. Lack of information is also supported by the knowledge scores. The mean knowledge score of women regarding prenatal screening tests was 3.43±3.21 (out of 10). Even given the time lapse since the tests were offered, this score is lower than would be considered acceptable for informed decision making. In another Turkish study, 55.5 % of pregnant women who had either (or both) the double or triple tests defined the triple test as an 'intelligence test for their baby' (Bilgin *et al.* 2010), which also indicates a lack of understanding of the screening tests. In Iceland, Stefansdottir *et al.* (2010) found that the average knowledge level on prenatal screening and diagnostic tests was between 3.3- 4.7 (out of 8) depending on expectent mothers' educational level. Barr and Skirton (2013) reported that in the United Kingdom many parents stated that they were not sufficiently informed and wanted individualized discussion with a health care professional about antenatal screening for Down syndrome. There may be some different reasons for pregnant women's lack of knowledge regarding prenatal screening tests in the study. For instance, Rowe *et al.* (2006) stated that health care professions are not well informed about tests and may lack the skills and knowledge

necessary to convey information in a genetic context. On the other hand, time spent for informing women about prenatal screening test also may be an important factor in women's knowledge level. A study revealed that most obstetricians in Japan do not provide their patients with sufficient information about second-trimester maternal serum screening. In the same study, it was also reported that the time spent with each patient explaining the screening process in more than half medical facilities was less than five minutes. This limited time may result in informing patients insufficiently (Okuyama *et al.* 2013). Therefore, research focusing on the reasons behind pregnant women's lack of knowledge is essential to adjust the health care povided accordingly.

In our study, educational level and knowledge level of women regarding prenatal tests were not correlated with women's decision to have a prenatal screening test. Likewise, in an study, Stefansdottir *et al.* reported (2010) that there was no effect of knowledge level regarding prenatal screening and diagnosis. Having a child with genetic condition, having a history of spontaneous abortion, being multiparous, and longer marriage duration were positively correlated with having a prenatal screening test in the currrent study. Similarly, the Icelandic researchers (Stefansdottir *et al.* 2010) indicated that personal experience of birth defects was likely to influence the acceptance of screening and this was also the case in our cohort. Even though religion was not investigated in the current study, its affect on prenatal screening has been reported in Israel. Sher *et al.* (2003) reported 60.9 % and 80.4 % of Israeli Jewish religious and secular women accepted the triple test with the high rate of uptake in the secular group. The main reason reported by Israeli Jewish women for not performing amniocentesis or the triple test was for religious or moral grounds (Sher *et al.* 2003). In addition, Gitsels vanderWal *et al.* (2014) stated that Islamic faith played a role in decision-making on having the combined test in

the study conducted in Muslim Turkish origin immigrants living in the Netherlands (Gitsels vanderWal *et al.* 2014b). As Turkey is a country where the Muslim faith is dominant, this may be a factor effecting decisions about having screening or diagnostic tests and could account for lower rates of uptake of screening in our study. However, Crombag *et al.* (2013) concluded that decision making on uptake of a screening test for Down syndrome is a complex process that takes into consideration many different and interacting factors rather than a simple yes-no decision. Perception towards Down syndrome, perceived guidance of health care professionals, and thoughts on abortion may play a role in the decision whether to take the test or not (Crombag *et al.* 2013). Therefore, further qualitative studies are needed to explore and improve our understanding of reasons and rationales for acceptibility of prenatal screening and diagnostic testing in Turkish society.

While Turkish nurses working in obstetrics clinics are called prenatal nurses, there is no special training or certification for becoming a prenatal nurse with exception of continuing nursing education. According to the the Turkish nursing regulations (Republic of Turkey Ministry of Health's Web site), they are responsible for providing counseling for families at risk of genetic conditions as well as providing antenatal and postanatal care to women. Health care professionals, especially perinatal nurses who are often in contact with pregnant woman, have a role to provide information regarding prenatal screening tests, to ensure each individual has been informed, and to indentify individuals who are at high risk and might benefit from genetic counselling. Rowe *et al.* (2006) reported that the participation rate in screening is higher in pregnant women who have made an informed decision then among those who did not. To ensure informed decision-making, time for consideration by both partners is needed. Therefore, ideally couples should be aware of the opportunity to have a screening test and time to discuss this

before the decision has to be made.

Limitations

We were able to recruit a relatively large cohort of Turkish women; however, they were recruited in one centre. Therefore, the results of the study are not generalisable. Further qualitative research is recommended to assess in detail the motives for having or not having screening test. The questionnaires used in this study were developed by the researchers, since there is no validated questionnaire assessing knowledge level of women related to prenatal screening.

Relevance to clinical practice

The study provides better understanding of acceptance or non acceptance of prenatal screening and needs of pregnant women about prenatal screening in Turkey. In prenatal screening, knowing pregnant women's opinions and knowledge level can inform health care professionals regarding women's educational needs in this respect. Healthcare professionals should provide information about screening tests to all pregnant women with more attention to pregnant women who are at risk for any genetic condition. Perinatal nurses as a first contact point for pregnant women are ideally situated to inform pregnant women about prenatal screening tests to improve access to health care services and to ensure inforrmed decisions are made by pregnant women and their partners.

Conclusion

This study contributes to baseline data on the uptake and reasons for acceptance or non-acceptance of screening in a cohort of Turkish women. Women who are multiparous and has a child with genetic condition, history of spontaneous abortion, and longer marriage are most likely to have prenatal screening test. It is evident that more information and education is needed

to promote informed decision making and consent and to provide adequate prenatal care as part of nursing care in this context.

What does this paper contribute to the wider global clinical community?

- Provides a baseline of data on the uptake and reasons for acceptance or non-acceptance of prenatal screening in pregnant women.
- Provides better understanding of acceptance or non acceptance of prenatal screening.
- Shows the need for education to ensure pregnant women make informed decision in having prenatal screening test.

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REFERENCES

Andermann A & Blancquaert I (2010) Genetic Screening, A primer for primary care. *Canadian Family Physician* 56 (4), 333-339.

Appelbaum PS (2007) Assessment of Patients' Competence to Consent to Treatment. *New England Journal of Medicine* **357** (18), 1834-40.

Turkey Public Health Institute (TPHI)), Department of Women and reproductive health. (2014). Antenatal Care Guide, Sağlık Bakanlığı Yayın No: 924 Ankara, 2014. Available at: http://bit.ly/1KP4ORI

Balkan M, Kalkanli S, Akbas H, Yalinkaya A, Alp AM, & Budak T (2010) Parental Decisions Regarding a Prenatally Detected Fetal Chromosomal Abnormality and the Impact of Genetic Counseling: An Analysis of 38 Cases with Aneuploidy in Southeast Turkey. *Journal of Genetic Counseling* **19**, 241–246.

Barr O, & Skirton H (2013) Informed decision making regarding antenatal screening for fetal abnormality in the United Kingdom: A qualitative study of parents and professionals. *Nursing and Health Sciences* **15**, 318–325

Bilgin S, Bildircin FD, Alper T, Tosun M, Cetinkaya MB, Celik H, Malatyalioglu E, & Kokcu A (2010) The Effect Of Screening Tests To Maternal Anxiety Levels On Pregnant Women (In Turkish). *Turk Jinekoloji ve Obstetrik Dernegi Dergisi* **7**(3), 206-11.

Bland JM, & Altman DG (1997) Statistics notes, Chronbach's alpha. *BMJ* 314, 572.

Crombag MN, Bensing JM, Iedema-Kuiper R, Schielen PC, & Visser G (2013) Determinants affecting pregnant women's utilization of prenatal screening for Down syndrome: a review of the literature. *Journal of Maternal-Fetal & Neonatal Medicine* **26** (17), 1676-1681.

Dolan S, Biermann J, & Damus K (2007) Genomics for Health in Preconception and Prenatal

Periods. *Journal of Nursing Scholarship* **39**(1), 4-9.

Dundar M, Uzak AS, Erdogan M, & Akbarova Y (2011) Prediction, prevention and personalisation of medication for the prenatal period: genetic prenatal tests for both rare and common diseases. *EPMA Journal* **2**,181–195.

English NK, & Hessler KL (2013) Prenatal birth planning for families of the imperiled newborn. *JOGNN* **42(3)**, 390-399.

Ergun P (2007) Gebelerin Üçlü Tarama Testi Ve Gebelikte Yapilan Diğer Testler Hakkindaki Bilgi Düzeyinin Ölçülmesi (Measuring the Level of Knowledge for Triple Screen Test and Others during Pregnancy) Master of science thesis on Women's health nursing, Ayfon Kocatepe University, In Turkish. Available at https://tez.yok.gov.tr/UlusalTezMerkezi/tezSorguSonucYeni.jsp

Evans MI, Andriole S, & Evans SM (2015) Genetics Update on Prenatal Screening and Diagnosis. *Obstetrics and Gynecology Clinics of North America* **42** (2), 193–208.

Gregg AE, Gross SJ, Best RG, Monaghan KG, Bajaj BG, Skotko BG, et al. (2013) ACMG statement on noninvasive prenatal screening for fetal aneuploidy. *Genetics In Medicine,* **15** (5), 395-8.

Gitsels-vander Wal JT, Verhoeven PS, Manniën J, Martin L, Reinders S, Spelten E, & Hutton EK (2014a) Factors affecting the up take of prenatal screening tests for congenital anomalies, a multicentre prospective cohort study. *BMC Pregnancy Childbirth* **14,** 264.

Gitsels-vander Wal JT, Martin L, Manniën J, Verhoeven P, Hutton EK, & Reinders S (2015a) A qualitative study on how Muslim women of Moroccan descent approach antenatal anomaly screening. *Midwifery* **31**(3), e43–e49.

Gitsels-vander Wal JT, Martin L, Manniën J, Verhoeven P, Hutton EK, & Reinders S (2015b)

Antenatal counselling for congenital anomaly tests: Pregnant Muslim Moroccan women's preferences. *Midwifery* **31**(3), 50–57.

Gitsels-van der Wal JT, Manniën J, Ghaly MM, Verhoeven PS, Hutton EK, & Reinders S (2014b) The role of religion in decision-making on antenatal screening of congenital anomalies: A qualitative study amongst Muslim Turkish origin immigrants. *Midwifery* **30** (3), 297–302.

Hacettepe University Institute of Population Studies (2014), "2013 Turkey Demographic and Health Survey". Hacettepe University Institute of Population Studies, T.R. Ministry of Development and TÜBİTAK, Ankara, Turkey. Available at http://,.hips.hacettepe.edu.tr/eng/index.html

Lewis JA (2011) Genetics and Genomics Impact on Perinatal Nursing. *Journal of Perinatal & Neonatal Nursing* **25**(2), 144–147

Novick, G. (2009). Women's Experience of Prenatal Care: An Integrative Review. Journal of Midwifery & Women's Health, 54 (3), 226-37.

Okuyama T, Yotsumoto J, & Funato Y (2013) Survey of second-trimester maternal serum screening in Japan. *Journal of Obstetrics and Gynaecology Research* **39**(5): 942–947.

Pagon RA, Hanson NB, Neufeld-Kaiser W & Covington M (2001) Genetic testing. *Western Journal of Medicine* **174**(5), 344-347.

Republic of Turkey Ministry of Health, regulation amending the regulation of nursing. Retrived July 22, 2015. From http://,.saglik.gov.tr/EN/belge/1-12606/hemsirelik-yonetmeliginde-degisiklik-yapilmasina-dair-,-.html

Rowe HJ, Fisher JR & Quinlivan JA (2006) Are pregnant Australian women well informed about prenatal genetic screening? A systematic investigation using the Multidimensional

Measure of Informed Choice. *Australian and New Zealand Journal of Obstetrics and Gynaecology* **46**(5): 433-439.

Sahin NH, & Gungor I (2008) Congenital anomalies: parents' anxiety and women's concerns before prenatal testing and women's opinions towards the risk factors. *Journal of Clinical Nursing* **17**, 827–836.

Shaw S, Chen C-P & Cheng P-J (2013) From Down syndrome screening to noninvasive prenatal testing: 20 years'experience in Taiwan. *Taiwanese Journal of Obstetrics & Gynecology* **52** (4), 470e-474.

Skirton H & Barr O (2010) Antenatal screening and informed choice: a cross-sectional survey of parents and professionals. *Midwifery* **26** (6), 596–602.

Skirton H & Barr O (2007) Influences on uptake of antenatal screening for Down syndrome: a review of the literature. *Evidence Based Midwifery* **5**, 4–9.

Stefansdottir V, Skirton H, Jonasson K, Hardardottir H & Jonsson JJ (2010) Effects of knowledge, education, and experience on acceptance of first trimester screening for chromosomal anomalies. *Acta Obstetricia et Gynecologic* **89**(7), 931–938.

Sher C, Romano-Zelekha O, Green MS & Shohat T (2003) Factors Affecting Performance of Prenatal Genetic Testing by Israeli Jewish Women. *American Journal of Medical Genetics* **120A** (3), 418–422.

Van den Berg M, Timmermans DRM, Kleinveld JH, Garcia E, van Vugt JMG & van der Wal G (2005) Accepting or declining the offer of prenatal screening fro congenital defects: Test uptake and women's reasons. *Prenatal Diagnosis* **25(1),** 84-90.

TABLES

Table 1. Sociodemographic characteristics of women

n=274		
Characteristics	**Mean ±SD**	
Age of women (in years)	29.93±6.81	
Age of women's husbands (in years)	31.66±7.25	
Duration of marriage (in years)	7.12±5.34	
Highest educational status	**n**	**%**
Elementary school and above	163	59.5
High school	92	33.6
University or higher	19	6.9
In regular employment		
Yes	24	8.8
No	250	91.2
In consanguinous marriage		
Yes*	27	9.9
No	247	90.1

SD: Standard Deviation, *3 are first degree cousins and the remainder are second degree cousins.

Table 2. Obstetric characteristics of women

n=274		
Parity	**n**	**%**
Primiparous (1st pregnancy)	121	44.2
Multiparous (≥2nd)	153	55.8
Gestational week		
Mean 35.4, SD 4.68 (range 20-43 gestational weeks)		
2nd trimester	6	2.2
3rd trimester	268	97.8
History of spontaneous abortion		
Yes	83	30.3
No	191	69.7
History of a maternal health problem during current pregnancy		
Yes	39	14.2
No	235	85.8
Type of maternal health problem in current pregnancy (n=39)		
Hypertension + diabetus mellitus	5	1.8
Hypertension	8	3.0
Diabetes	5	1.8
Hypotension	16	5.9
Hyperthyroid	2	0.8
Increaed liver enzymes	1	0.4
Cholestasis	2	0.8
Chronic Health problem before pregnancy		
Yes	21	7.7
No	253	92.3
Type of chronic maternal health problem before pregnancy		
Hypertension	6	2.2
Hypotension	1	0.4
Hyperthyroid	6	2.2
Familial Mediterranean Fever (FMF)	1	0.4
Epilepsy	1	0.4
Diabetes mellitus	5	1.9
Asthma	1	0.4

Table 3. History of having noninvasive genetic screening tests

n=274	**n**	**%**
Double test only	35	12.8
Ttriple test only	13	4.7
Both the double and triple test	51	18.6
No screening test	164	59.9
Do not remember	11	4.0
Did you ever think of declining a screening test (n=99)		
Yes	21	21.4
No	78	78.6
Reasons for thinking of declining a screening test* (n=21)		
The fear of harming the baby	4	19.0
Believing there was no action to be taken in case of bad result	2	9.52
Believing there was no need for the test	7	33.33
To avoid feeling bad in case of bad result	8	38.09
Reasons for not thinking of declining the screening test* (n=78)		
The test is easy	4	5.12
To want to check baby's health	4	5.12
Doctor ordered it	12	15.38
To learn in advance if there is a problem with baby	15	19.23
Believing it is necessery to get tested	5	6.41
Missing values	38	48.71
Result of the genetic screening test* (n=99)		
Normal	88	88.9
Increased risk from one test	6	6.1
Increasd risk from two tests	5	5.1
Need for information regarding prenatal screening tests (n=99)		
Yes	32	32.3
No	63	63.6
Yes before or at time of getting tested, but not now.	4	4

*Women could choose more than one answer.

Table 4. Knowledge Assessment Regarding Prenatal Tests (N=274)

Kownlege assessment statements	Correct answer	
	n	%
1. The double test should be done between the 11th and 13th week of gestation.	145	52.9
2. Triple test should be done between 16th -20th week of gestation.	140	51.1
3. Double and triple tests are screening tests to determine risk level of having fetus who has a congenital abnormallity, instead of giving definitive result on it.	130	47.4
4. Bad results on the double or triple tests do not show the baby will definitely have a disability.	121	44.2
5. The double or triple tests deterime some genetic disorder such as Down syndrome, trisomy 18 or neural tube defect rather than all genetic disorders.	111	40.5
6. Amniocentesis and chorionic villus sampling are diagnostic tests that show whether the fetus has congenital abnormality.	65	23.7
7. If the determined risk level is 1/250 or below, according to the triple test, there is need for further tests to clarify.	64	23.4
8. If the determined risk level is 1/300 or below, according to the double test, there is need for further tests to clarify.	63	23.0
9. The amniocentesis should be done between the 15th and 19th week of gestation.	56	20.4
10. A needle is inserted through the mother's abdominal wall during amniocentesis, and a sample of fluid is taken from the mother's womb.	52	19.0
Mean of total score (0-10; min-max)	3.43±3.21	

Table 5. Comparision of status of a having prenatal screening test and some characteristic of pregnant women

	Not had any prenatal screening test (or not remember)		Had a prenatal screening test			
Educational level of women*	**n**	**%**	**n**	**%**	Test statistic	p value
Elementary	103	63.2	60	36.8	.563	.755
High school	61	66.3	31	33.7		
University or higher	11	57.9	8	42.1		
Educational level of husband*						
Elementary	102	65.0	55	35.0	5.216	.074
High school	59	67.8	28	32.2		
University or higher	13	44.8	16	55.2		
Consanguineous marriage*						
Yes	10	37.0	17	63.0	9.344	.002
No	165	66.8	82	33.2		
Having child with genetic disorder*						
Yes	-	-	6	100	10.844	.001
No	175	65.3	93	34.7		
History of spontaneous abortion*						
No	134	70.2	57	29.8	10.805	.001
Yes	41	49.4	42	50.6		
Parity *						
First pregnancy	89	73.6	32	26.4	8.808	.003
Second or more	86	56.2	67	43.8		
Age of woman**	29.12±6.41		31.35±7.29		-2.626	.062
Age of husband**	30.38±6.88		33.94±7.36		-2.462	.647
Duration of marriage**	6.53±4.69		8.17±6.23		-2.462	<.001
Knowledge level on prenatal test**	2.91±3.30		4.33±3.17		-3.444	.320

* chi square test; ** t test