Prenatal Ultrasound Screening and Women’s Expectations: an Original Study

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ABSTRACT

Background: Prenatal screening offers crucial information about the pregnancy, although sometimes brings forth ethical issues and potentially difficult decisions for pregnant women. Ultrasound screening during pregnancy is both of particular importance and a great challenge. Objective: The objective of this study is to assess women's knowledge and expectations regarding prenatal ultrasound screening in Greece. Methods: The study was conducted between May 2019 and January 2020. Three hundred pregnant women >18 years of age with complete antenatal routine screening, were invited to participate. The questionnaire contained sociodemographic and obstetric history information and highlighted the background knowledge of pregnant women in prenatal screening. Results: In this study, women with university or technological education mentioned in a greater proportion the importance of prenatal screening regarding prevention and treatment of congenital anomalies or chromosomal abnormalities and devastating diseases. The belief that the pain or sorrow to give birth to a disabled child or one with a genetic disorder might lead parents to the decision to terminate the pregnancy, was supported more by women with a higher educational level. Conclusion: Pregnant women place a great deal of trust in their physician, as a source of information for the fetal well-being. The majority consider prenatal testing mandatory for that matter. Finally, an association between women who abide with prenatal screening and their educational level was noted. Thus, it's more common women who have a higher educational level to seek prenatal screening, than those with lower education level. Keywords: ultrasound scan, informed consent, pregnancy, bioethics, prenatal screening.

1. BACKGROUND

Many years ago, pregnancy was a very tenuous period in a woman’s life. Maternal mortality rates had reached 9 in 1000 births in the 1900s, while 100 infants in 1000 births passed away during their first year of life. Since then, a significant decline in mortality rates have been recorded, mainly due to the advancements of medical sciences in the area of prenatal screening (1).

Nowadays, pregnant women have access in services of prenatal screening for fetal abnormalities and devastating diseases, including congenital anomalies or chromosomal abnormalities. These tests are able to detect early fetal anomalies before viability of the fetus. Acting on that timeframe, there is a significantly improved outcome regarding the pregnancy (2).

Ultrasound scanning is an important part of the prenatal screening. In the first trimester, the most accurate gestational age and estimated due date can be calculated with specific ultrasound measurements (1). Nuchal translucency (NT) is an effective marker for chromosomal anomalies, carrying a detection rate of 80% for Down syndrome (3).
to detect congenital anomalies or aneuploidy markers, in addition to maternal pelvic pathology (5).

Third trimester ultrasound scan is used to detect conditions related to elevated fetal morbidity, such as fetal growth restriction (FGR), the position and the presentation of the fetus. Furthermore, it can detect fetal defects or congenital diseases that were missed or could not be detected in previous ultrasound examinations. Although many malformations can be identified, it is acknowledged that some of them may be missed. It is worth noticing that some can only be recognized in the third trimester, such as congenital cardiac abnormalities, urogenital abnormalities and abnormalities of the central nervous system. Despite this, the scientific community has not established a common ground on the benefits of routine ultrasound in late pregnancy (6).

Many controversial issues arise from ultrasound screening in pregnancy. Health care professionals are mainly concerned with its benefits, as well as its costs and ethical issues. Although it is usually a pleasant event and an exciting experience for the woman, false positive and false negative results can deal a heavy psychological blow in the prospective mother and fill her with uncertainty and anxiety (7).

Pregnancy is a significant and joyous event, but it can also become a source of stress and psychological fluctuations. Challenges that present themselves to the new parents reveal increased vulnerability in the equilibrium of mental health. Antenatal or postpartum anxiety and depression have been frequently recorded in varied intensity, from nonspecific feelings to seriously detrimental for the new mother (8). Therefore they are related with pregnancy complications and pregnancy loss.

Prenatal screening for congenital abnormalities has given rise to the option of interruption of pregnancy. One further issue which may occur, is the communication between health care professionals and families. Parents counseling is already complicated due to limited evidence or the availability of alternative treatments. Decision making perplexes the ethical considerations of this issue and can present additional difficulties, as it can be affected from education, cultural and religious background, individual cognitive and emotional processes. A challenge is, therefore, posed for health care professional to be as objective as possible when counseling couples or chooses treatments (9).

Published literature focuses on postpartum period to a far greater extent than the antenatal period (8). It has also been recorded that pregnant women educated in prenatal examinations respond better to stress and anxiety. They use counseling services and keep a positive attitude towards screening tests with less psychological consequences (10).

2. OBJECTIVE

This original study aims to explore the pregnant woman’s experiences and expectations according to their educational level and the elements that contribute in their decision-making process. In addition, the knowledge that will be obtained will assist healthcare professionals to communicate more effectively with prospective parents, enhancing the consultation provided during prenatal visits.

3. MATERIAL AND METHODS

Study Design

This descriptive study was performed in the General and Maternity Hospital Helena Venizelou, in Athens, during the time period of May 2019 to January 2020. Women are informed and offered three ultrasound examinations as part of their routine prenatal screening (First trimester: Nuchal Translucency, Second trimester: b-level or Anatomy scan, Third trimester: Doppler scan). All participants signed an informed consent agreement and were advised of their right to withdraw from the study at any point of time without repercussions.

Data Collection

Inclusion criteria for the study were: women aged over 18 years old, with complete antenatal routine examination and adequate communication either by themselves or with the help of a translator. An anonymous questionnaire, designed specifically for the study, with the aid of past studies on this matter (11-22), was given to the women participating. Before completing the questionnaire, all women were informed about its contents, both in writing and orally. The questionnaire assessed the background knowledge of prenatal screening in pregnant women, sociodemographic and obstetric history information, perceptions regarding the availability of information and necessity of prenatal screening and individual approach to ethical issues.

Statistical analysis

Normal distributed variables are expressed as mean (standard deviation); while variables with skewed distribution are expressed as median (interquartile range). Qualitative variables were expressed as absolute and relative frequencies. For the comparison of proportions chi-square and Fisher’s exact tests were used. Mann-Whitney and Kruskall-Wallis test were used for the comparison of continuous variables between two or more than two groups respectively. All reported p values are two-tailed. Statistical significance was set at p<0.05 and analyses were conducted using SPSS statistical software (version 22.0).

4. RESULTS

Sample consisted of 300 women with mean age 33.1 years (SD=4.6). The majority of women were married (89.7%) and 93.7% were Greek. 77.3% of the women worked and 89.1% were Christian Orthodox. 47.5% were certified graduates of University / Technological academic institutes, 24.4% were qualified Postgraduate education Bachelors and 3.7% were qualified for a Doctorate or Post-Doctoral Degree. On participants’ medical history and current pregnancy, we had information about the number of pregnancies which was 2 or more in 42.5% and 5% of the women had an IVF. Number of induced abortions was one or more in 20.5% of the women.

Unhealthy fetus in previous pregnancy and embryonic dysplasia in previous pregnancy were recorded in 1.7% of the sample, while artificial Insemination was recorded 3.7% of the women. The mean gestational age was 31.3 weeks (SD=5.4) and 11% had diabetes. Bleeding and Hypertension were recorded in 7% and 0.7% of the pregnancies, respectively. In our sample 94% declared that the mother has the right to self-determination and almost half of the
| Educational level                      | Mandatory/ Secondary education | University – Technological education | Postgraduate education/ Holder of a doctorate or post-doctoral degree | P  |
|---------------------------------------|-------------------------------|--------------------------------------|---------------------------------------------------------------|----|
| Do you consider that the mother has the right to self-determination (taking decisions by herself) | No                            | 8 (11)                               | 6 (4.2)                                                        | 4 (4.8) | 0.123+ |
|                                       | Yes                           | 65 (89)                              | 136 (95.8)                                                     | 80 (95.2) |
| Do you agree that the couple has the right to choose the sex of the baby?, median (IQR)† | 0 (0 – 0)                     | 0 (0 – 1)                             | 0 (0 – 1)                                                      | 0.170‡ |
| Do you agree with the donation of genetic material?, median (IQR)† | 3 (2 – 4)                     | 3 (2 – 3)                             | 3 (2 – 4)                                                      | 0.545‡ |
| Do you agree that other methods of obtaining a child may be preferred, such as adoption or fostering?, median (IQR)† | 4 (3 – 4)                     | 4 (3 – 4)                             | 4 (3 – 4)                                                      | 0.586‡ |

What do you consider as "disability or genetic disorder", in order to make a decision to terminate the pregnancy

| Severe congenital malformations on the anatomy of the fetus which could possibly be treated surgically would not have a complete cure (i.e. skeletal malformations: spinal cord injury, hydrocephalus, severe heart diseases, etc.) | No                            | 24 (33.8)                             | 27 (19.4)                                                      | 17 (20.2) | 0.049+ |
|-------------------------------------------------------------------------------------------------|-------------------------------|--------------------------------------|---------------------------------------------------------------|----|
|                                                                                                 | Yes                           | 47 (66.2)                             | 112 (80.6)                                                     | 67 (79.8) |

Moderate degree malformations on the anatomy of the fetus that can be treated in surgery and have complete cure (cleft lip, bowleg, hiatal hernia...) | No                            | 61 (85.9)                             | 124 (89.2)                                                     | 70 (83.3) | 0.444+ |
|                                                                                                | Yes                           | 10 (14.1)                             | 15 (10.8)                                                      | 14 (16.7) |

Chromosomal abnormalities? (Down syndrome, Trisomy 13, trisomy 18...) | No                            | 12 (16.9)                             | 26 (18.7)                                                      | 12 (14.3) | 0.696+ |
|                                                                 | Yes                           | 59 (83.1)                             | 113 (81.3)                                                     | 72 (85.7) |

Ultrasound findings that are not significant indicators for fetus abnormalities – soft markers (Intestinal ultrasound of the fetus, ventriculomegaly, single umbilical artery,...) | No                            | 61 (85.9)                             | 125 (89.9)                                                     | 79 (94) | 0.238+ |
|                                                                 | Yes                           | 10 (14.1)                             | 14 (10.1)                                                      | 5 (6) |

During the ultrasound scan, do you understand the images?, median (IQR)† | 3 (2 – 3)                      | 3 (2 – 3)                             | 3 (2 – 3)                                                      | 0.320‡ |
| Do you find as benefit of the prenatal testing | The ability of legal interruption of pregnancy | No                            | 50 (68.5)                             | 107 (75.4)                                                      | 54 (64.3) | 0.191+ |
|                                                                 | Yes                           | 23 (31.5)                             | 35 (24.6)                                                      | 30 (35.7) |

Interruption of pregnancy when the wife wishes | No                            | 55 (75.3)                             | 113 (79.6)                                                     | 57 (67.9) | 0.143+ |
|                                                                 | Yes                           | 18 (24.7)                             | 29 (20.4)                                                      | 27 (31.2) |

The interruption of pregnancy when there is a case of serious disability or disease of the fetus | No                            | 14 (19.2)                             | 27 (19)                                                        | 8 (9.5) | 0.134+ |
|                                                                 | Yes                           | 59 (80.8)                             | 115 (81)                                                      | 76 (90.5) |

The prenatal screening refers to the prevention and treatment of intrauterine diseases | No                            | 32 (43.8)                             | 38 (26.8)                                                      | 36 (42.9) | 0.011+ |
|                                                                 | Yes                           | 41 (56.2)                             | 104 (73.2)                                                     | 48 (57.1) |

Do you believe that the pain, sadness or sorrow that the parents will experience through their lives by bringing a child with disability or a genetic disorder into the world, is capable of leading them to a decision of termination of pregnancy?, median (IQR)† | 3 (2 – 3)                      | 3 (2 – 3)                             | 3 (2 – 3)                                                      | 0.001‡ |

Do you consider that prenatal testing and diagnosis are significant parameters for the care of the pregnant woman?, median (IQR)† | 4 (3 – 4)                      | 4 (3 – 4)                             | 4 (3 – 4)                                                      | 0.519‡ |

Are you aware of the legislation on the "concept of the fetus as a patient" and the "right to life"? | No                            | 57 (78.1)                             | 102 (71.8)                                                     | 50 (39.5) | 0.032+ |
|                                                                 | Yes                           | 16 (21.9)                             | 40 (28.2)                                                      | 34 (20.5) |
women declared that the right for self-determination of the mother can be affected in case of rape (50%), in cases of a minor mother (56%), in cases where the mother is disabled (55.7%) and in cases where the mother decides to continue the pregnancy, without the consent of her partner (40.3%).

Based on the right of protection of 'fetal life', in cases of an unhealthy fetus, the person that women declared that should decide the termination of the pregnancy was the doctor in 53.7% and the pregnant woman in 49.7%. 95.3% agreed very or very much that the mother and the father have the right to jointly decide on pregnancy related issues, while only 6% agreed very or very much that the couple has the right to choose the sex of the baby. Also, 78% declared to be familiar with the term 'genetic material donation', while 66% agreed very or very much with the donation of genetic material and 82.4% reported that parents should freely decide not to give birth to a child with disability or a genetic disorder. Chromosomal abnormalities and severe congenital malformations on the anatomy of the fetus were the most common genetic disorder in order to make a decision for termination of pregnancy. More than 70% of the women said that they had collected adequate information on Prenatal diagnostic testing, fetal abnormalities and their characteristics but also prenatal diagnosis on Down Syndrome. Only 54% declared to understand the images during the ultrasound scan and 69.4% were very or very much satisfied by the information provided by health experts.

The most common reasons for the decrease in the rate of pregnant women going under prenatal testing were lack of education of the pregnant woman, lack of information by the medical personnel and financial reasons. Medical obligation was the most common informed consent for the pregnancy termination on the occasion of serious fetal disability or disease (83.7%) and prevention or treatment of intrauterine diseases (64.3%). Almost all the women agreed that pregnant women should be thoroughly informed about the possibility of miscarriage when performing invasive prenatal testing, such as chorionic villus sampling and amniocentesis.

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tional level considering as a disability or genetic disorder, any severe congenital malformation on the anatomy of the fetus which could possibly be treated in surgery but without achieving a complete cure; was less common in those with lower educational level. The belief that the pain, sadness or sorrow that the parents will experience through their lives by bringing a child with disability or a genetic disorder into the world is capable of leading them to a decision to terminate the pregnancy, was supported more from women with higher educational level. Additionally, women with higher educational level were more aware of the legislation on the “concept of the fetus as a patient” and the “right to life”.

5. DISCUSSION

Prenatal screening in pregnancy is difficult to evaluate in medical as well as psychological terms. A major reason being that the examination is not typical like the most other medical procedures and carry ethical implications and difficult decisions (17). Parents need to be well informed about the aim of the procedure and it is no option which they can say ‘yes’ or ‘no’ especially when found possible fetal risks (14). The examination involves informing women of what can be diagnosed by ultrasound scan, the potential risks of diagnosis and information about different fetal conditions (22).

If a fetal malformation is diagnosed, some pregnant women feel shock, grief and worry about the future of the unborn child and might opt for termination, while others mainly prepare themselves for what is to come and decide to continue the pregnancy (14). The importance of an informed decision making is based on ethical considerations concerning parents autonomy in health decisions, the subjective variability in making the right choice and the presumed benefit for pregnant woman (13). Well informed women with educational background seem to be aware of ultrasounds diagnostic limitations and understand ‘well-grown fetus’ or ‘to exclude malformations’ (15).

To the best of our knowledge, this is the first study that attempts to associate the educational level of the pregnant women with the necessity of prenatal screening, according to their perceptions. The main results of this study showed that pregnant women have a well-educated background regarding the goals of prenatal screening. Most advocate that the mother and the father have the right to jointly decide on pregnancy related issues, although the decision to continue or not the pregnancy, lies on the mother. In the case of an abnormal fetus, their obstetrician was the person that the women trusts the most in taking the decision for the termination of pregnancy.

Pregnancy is a time of vulnerability for the woman, enhanced by her fear for the well-being of the baby (23). So, it is very important to be handled with great care by the healthcare providers (Obstetricians and Midwives) overseeing the health of the mother and her child. Previous studies have shown that a counseling session of the possible risks occurring antepartum can improve understanding of their situation, as well as transmitting the information needed for a smooth pregnancy and contributing to the calmness of the pregnant woman (24). Our study has shown encouraging results in the area of prenatal testing. More than 70% were adequately informed in their prenatal period and antepartum observation. Furthermore a great proportion was found satisfied with the services of the healthcare professionals.

It has been shown that sonographic prenatal examination can be beneficial for the emotional status of the expecting mother (25). Respecting their feelings is seen as important for the pregnant women. During the clinical evaluation and the proposed therapeutic approach healthcare professionals that take the time to inform women and explain the various processes of prenatal screening are able to earn more easily the trust of the pregnant woman.

Since there are many possible reasons for the termination of a pregnancy, such as a disease or a serious disability of the fetus, the prevention and treatment of intrauterine diseases, prenatal diagnosis is highly valued. Almost every participant wished to be thoroughly informed on the possibility of miscarriage in the case of invasive prenatal testing, such as chorionic villus sampling and amniocentesis. Healthcare professionals ought to take this into consideration when relaying information regarding the viabilities of the fetus.

Lastly, the answers of the participants were correlated with their educational level. Statistically significant difference was found in the questions for severe congenital malformation of the fetus, treatment of intrauterine diseases, negative feelings that the parents experience and the concept of the fetus ‘as a patient’ and ‘the right to life’. Women with a higher educational background were more likely to be well informed on the goals of prenatal examination, the current legislation and making the decision of terminating the pregnancy when faced with bringing a child with disabilities.

The questionnaire that associated matters of bioethics with religion did not produce enough statistically significant results, apart from the belief that donation of genetic material is not seen favorably. More studies on this part could clarify further the women’s beliefs.

6. CONCLUSION

From our study, we can gather the following conclusions:

Pregnant women place a great deal of trust on their physician as a source of information for the welfare of the fetus, and their physician opinion for the continuation of the pregnancy is the first to consider. Most recognize prenatal testing mandatory for assuring the health of the embryo. Lastly, an association between women who abide with prenatal screening and their educational level was noted. Thus, it’s more common women who have a higher educational level to seek prenatal screening, than those with lower education level. In concusion, there is a great need to organize advisory groups that constitute practitioners from the fields of Obstetrics, Genetics and Midwifery, whose goals consist of promoting holistic information regarding maternal and fetal health during pregnancy, ideally adapted according to the educational level and the expectations of women.

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