

Pregnancy Divisions - Trimesters or Quintiles? Time to Change the Paradigm

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Abstract

Total pregnancy duration of 40 weeks has been traditionally divided into three trimesters with varying cut offs between different trimesters. This limits the trimester-wise predictive benefit for improving maternal and fetal outcome. A novel division into 5 equal quintiles of 8 weeks each is suggested with focused obstetric care in each quintile, which may in turn lead to better obstetric care.

Keywords: *Pregnancy; Trimester; Period of Gestation; Quintile; Obstetric Care during Pregnancy*

Abbreviations

NIPT: Non Invasive Prenatal Testing; MVA: Manual Vacuum Aspiration; UCFS: University of California San Francisco

Introduction

Since time immemorial, pregnancy has been divided into different components. Initially, the total duration of nine months of pregnancy was divided in three periods of three months each which was labeled as trimester. Each trimester was considered to be a different phase of fetal development. The first trimester as time of basic cell differentiation, the second trimester as a period of rapid growth and maturation of body systems and the third trimester marking the final stage of fetal growth. This trimester and pregnancy concludes with childbirth [1].

As knowledge advanced, obstetricians started recognizing weeks of pregnancy instead of months. A pregnancy is considered full-term at 40 weeks. For defining trimesters, 40 weeks had to be divided into 3 parts. However, we find different concepts for division of trimesters into weeks, since 40 is indivisible by three. Besides being arbitrary, this division is also limited in its prediction of maternal and fetal outcome, which is better correlated with weeks of pregnancy.

Thus, we are proposing a new system of dividing 40 weeks of pregnancy into 5 equal segments of 8 weeks each (quintiles) and will be discussing the rationale for the same.

Definition of trimester and current divisions

The Webster dictionary defines trimester as a period of three or about three months. This term is also used sometimes for division of the academic year. In pregnancy it is taken synonymous with three months of pregnancy [2].

There are several ways to divide pregnancy into three by different authorities dealing with women’s health and obstetrics. The ‘Office on Women’s Health expert group defines the three trimesters as follows, though it mentions that the timing can vary [3]:

- First trimester: 1 - 12 weeks
- Second trimester: 13 - 28 weeks
- Third trimester: 29 - 40 weeks.

UCFS health [4] divides trimesters as:

- First trimester: 0 - 13 weeks
- Second trimester: 14 - 26 weeks
- Third trimester: 27 - 40 weeks.

Nemours Kids Health [5] defines each week of fetal development in details, however takes trimesters as

- First trimester: 1 - 12 weeks
- Second trimester: 13 - 26 weeks
- Third trimester: 27 - 40 weeks.

Division by Healthline [6] is as follows:

- First trimester: 1 - 12 weeks
- Second trimester: 13 - 27 weeks
- Third trimester: 28 - 40 weeks.

Most public domain websites about pregnancy care [7] talks about the three trimesters in a pregnancy: the first trimester, which lasts from approximately weeks 1 to 13, the second trimester, which lasts from about week 14 to week 27, and the third trimester, which lasts from around week 28 to week 40 (and up). John Hopkins describes in detail about pregnancy care in all 3 trimesters [8], however does not mention any specific weeks.

As one can see from this, there is no uniformity when first trimester ends, or when third trimester begins. Even most surveyed had very varying concepts about trimester (Mittal S, unpublished data). However, as per traditional teaching most considered 28 weeks as period of viability. Although, in the present scenario immature fetuses between 24 - 28 weeks sometimes survive, when provided with good neonatal care.

Proposed classification

We propose that pregnancy be divided into five equal quintiles of 8 weeks each. Quintile is a statistical term in Webster and Lexico dictionaries [2,9]. It means dividing a sample or population in 5 equal parts. Suggested division for pregnancy is as follows:

- First quintile - 0 - 8 weeks
- Second quintile - 8 - 16 weeks
- Third quintile - 16 - 24 weeks
- Fourth quintile - 24 - 32 weeks
- Fifth quintile - 32 - 40 weeks.

We also considered dividing into 4 equal parts as quartiles of pregnancy, however, feel that each week of pregnancy being significant, smaller divisions help in better predicting improving maternal and perinatal care and outcome.

Rationale for proposed classification

A Defined landmark for beginning and end of each quintile, the care givers can be more focused.

First quintile - Upto 8 weeks from the first day of last menstrual period the pregnancy is the first quintile. In this, the pregnancy is getting established and is called an embryo. It is the period of organogenesis. All major body systems, including the circulatory, nervous, digestive, and urinary systems start to develop and function during this period. The eyes, nose, mouth, and ears become distinct and heart beat can be heard with Doppler. During this period main focus is on detecting pregnancy location and viability. Most ectopic pregnancies or pregnancy abnormalities like hydatidiform mole or blighted ovum can be diagnosed and appropriately managed. Teratogens do most harm during this period and majority of miscarriages due to genetic defects occur spontaneously at this period. In case of an unwanted pregnancy both medical abortion as well as manual vacuum aspiration (MVA) are safe during first the quintile.

Second quintile - After 8 weeks, the embryo is now referred to as a fetus. As the pregnancy advances into the second quintile, the external genitalia, finger and toe nails, eyelids, larynx and trachea are developed. All major organs and body systems develop and even during this period the fetus can be damaged if exposed to drugs, infectious agents and other teratogens. This quintile is important from the point of prenatal genetic screening including serum markers (double, triple or quadruple test depending on weeks of pregnancy) and ultrasound scan for nuchal thickness and nasal bone. If indicated, NIPT, chorion villous sampling and/or amniocenteses is also be carried out during this quintile. In case fetal reduction or termination of pregnancy is to be considered, it is safer in this quintile.

Third quintile - From 16 weeks onwards pregnancy is clinically visible and mother also starts gaining weight. A detailed morphological scan is to be carried out during this quintile between 18-19 weeks as all organs are fully formed by this time. Position of placenta and multiple pregnancies are noted during the ultrasound. Fetal movements can be perceived by the mother during this quintile. This is the time to also immunize the mother for seasonal flu, tetanus and Covid-19. Early pregnancy symptoms also subside by now and woman feels better. Fetal Echocardiography needs to be carried out and if any gross malformations are detected termination of pregnancy is legal till end of this quintile in most countries. Spontaneous late abortions can also occur during this quintile if there is a uterine anomaly or incompetent cervical os, thus appropriate care is to be provided accordingly. Nutritional supplements are an important component of pregnancy care at this stage for maternal and fetal wellbeing.

Fourth quintile - Fetus continues to grow gradually and movements continue to become more vigorous. In this quintile extending from 24 - 32 weeks, main focus is on detecting pregnancy complications like gestational diabetes and pre-eclampsia. Glucose challenge test and regular weight and blood pressure monitoring is to be carried out. Those at risk of intrauterine growth restriction or preterm birth also need to be cautious from this quintile onwards. Immunization for triple antigen (diphtheria, tetanus and pertussis) is to be done from 27 weeks onwards and Covid-19 vaccination if not completed should be done. For Rh negative pregnancy antenatal Anti-D

injection is given. Babies born during this period are capable of survival with good neonatal care. Most airlines will not allow air travel after this quintile, thus if delivery is planned elsewhere, travel should be planned accordingly.

Fifth quintile - This is the final phase of pregnancy. During this period there is rapid growth of the baby with strong fetal movements. If everything is going well, just keeping the fetal kick count is enough for monitoring with obstetric palpation every 2 weeks initially and then weekly to monitor growth. Blood pressure monitoring is continued as late onset pre-eclampsia may begin now. In those with high risk of gestational diabetes blood sugars are again assessed. For high risk pregnancy, periodic intensive fetal monitoring for fetal well being including non stress test, ultrasound Doppler and Manning score is to be done during this quintile. Fetal position also stabilizes by mid of this quintile (36 weeks), thus timing and mode of delivery is planned accordingly. Though prematurity is there till 37 weeks, however, with modernization of medicine, most babies born during fifth quintile survive.

Recommendations

We request our colleagues to think favorably about division of pregnancy into quintiles. Once acceptable, tables can be created for changes during each quintile and broad guidelines can be prepared for obstetric management with expert group review.

Conclusion

In view of rapid advances taking place in both diagnostic and therapeutic approach to pregnancy, the time has come that we should relook at the old fashioned arbitrary division of pregnancy in three trimesters. A novel concept of dividing pregnancy in to five equal quintiles supported by clinical, embryological, investigational and therapeutic approaches is proposed. To consider every pregnancy as precious and to provide the best of available expertise for care of mother and child during pregnancy will certainly go a long way in improving maternal and perinatal outcome.

We strongly propose that this historical change of dividing pregnancy in quintiles should be incorporated for a successful journey through pregnancy.

Conflict of Interest

None.

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