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The Duration of a Human Pregnancy – Medical Fact or Cultural Tradition?

B. Elverdam, H. Wielandt

Institute of Community Health and Institute of Gynaecology and Obstetrics, University of Odense, Odense, Denmark

Abstract

The present paper examines pregnancy length from an epistemological angle. It argues that the 280 days or 40 weeks or 10 "moon months" duration, calculated from the first day in the last menstrual period, is a cultural and social tradition which has been turned into a medical fact, and with time has had profound implications for antenatal care. It is suggested that the obstetric outcome may be evaluated in relation to actual gestational age, avoiding the labels preterm, term, and prolonged (post-term).

Zusammenfassung

Dieser Beitrag untersucht die Aussagen über die Länge der Schwangerschaft auf ihre inneren Vorannahmen hin. Der wesentliche Gedanke ist, daß die 280 Tage oder 40 Wochen oder 10 „Mondmonate", gerechnet vom ersten Tag der letzten Menstruation an, eine kulturelle und soziale Tradition ausdrücken, die sich in eine medizinische Tatsache verwandelt hat, woraus sich in der Zwischenzeit weitgehende Implikationen für die vorgeburtliche medizinische Fürsorge ergeben haben. Es wird vorgeschlagen, daß der Stand der Schwangerschaft als Entwicklungsalter bestimmt wird und die Ausdrücke Frühgeburt, termingerecht und Übertragung vermieden werden.

Correspondence to: Beth Elverdam, social anthropologist, and Hanne Wielandt, MD, Institute of Community Health and Institute of Gynaecology and Obstetrics, University of Odense, Winsløparken 17, DK-5000 Odense C, Denmark

Introduction

In vitro fertilisation (IVF) and egg transplantation are milestones in the treatment of infertility. In addition they have contributed to a better understanding of the development of pregnancy. Performance of IVF provides precise information about time of conception and gestational age.

A human pregnancy is commonly perceived as a well-defined period lasting 280 days when calculated from the first day of the last menstrual period, or 266 days from ovulation, assuming that the woman menstruates every 28 days and ovulates on the 14th day[1]. Calculating from ovulation, a recent study has reported a significantly longer median duration of pregnancy – 274 days in primiparas and 269 days in multiparas[2]. The World Health Organization defines delivery at term as one that occurs from 37 to less than 42 completed weeks of pregnancy[3], thus indicating a rather wide variation in pregnancy length.

An exact gestational age based on technology seems to be in conflict with the above-mentioned variations in pregnancy length, indicating two paradigms and having consequences for antenatal care. The present paper focuses on the concept of the duration of human pregnancy from an epistemological angle. The relationship between cultural, societal, and medical aspects is examined. Regarding the cultural material, we have concentrated on European and Islamic traditions. Islam was considered because one of us (BE) has first-hand experience with Muslim immigrants and because Muslim tradition, while sharing the cultural background of both Christianity and Judaism, is different.

The Duration of a Human pregnancy

The estimation of pregnancy length stems from "Naegele's algorithm", which states that the duration, calculated from the first day of the last menstrual period, is on average 280 days. An English translation of Dr. Naegele's (1778–1851) text was published in 1829. Most obstetrical textbooks mention this procedure of calculation; it is the basis for the design of the popular "wheel" that is used to estimate the day of confinement and to schedule the antenatal care.

Naegele's algorithm also states that the length of pregnancy is 10 menstrual cycles or 10 "moon months". The relationship between time and the moon cycles is old; Judaism used Babylonian and Semitic knowledge and divided the year into 12 moon-cycles, inserting extra periods in order to adjust to the seasons. Greek culture absorbed this time reckoning. Later, the Egyptian solar calendar was adopted for Roman use by Julius Caesar (46 B.C.). This fusion of chronological understanding is the basis of the modern calendar. Yet, the implication of moon cycles is maintained in relation to menstrual cycles and pregnancy.

The duration of the human pregnancy is often stated as 40 weeks ($40 \times 7 = 280$). The "holy" figure 7 is long-established in most Western civilisations (7 days in a week, for instance). It stems from very old astronomical observations and the knowledge in Babylon of 7 celestial bodies (the sun, the moon, and 5 planets). The figure 40 also has very ancient roots. In Babylonian culture it alludes to a perfect entity[4]. In Greek it refers to "young women bearing a perfect offspring". Both indicate an old relationship between 40 and pregnancy[4]. In the

Old Testament the figure 40 is mentioned several times in relation to periods of social transition (rites de passage). According to the New Testament, Jesus fasted for 40 days and nights in the Wilderness. This perception still persists in the word quarantine (from quarantina, Italian for a period of 40 days), referring to a period of isolation in order to avoid the spread of infection.

Last Menstrual Period as the Determinant Factor

In the clinical management of pregnancy, the estimation of the duration of pregnancy is questionable when the exact time of conception is unknown. The last menstrual period is usually taken as the onset of pregnancy. The relevance of this parameter is probably due to practical circumstances because it is possible to collect a menstrual history from the majority of women. The obstetricians and neonatologists maintain that the last menstrual period is the determinant factor. For instance, they speak about a 32-week pregnancy, realising that the "true" gestational age may only be 30 weeks or less because ovulation and conception occurred about 2 weeks later than the last menstruation.

The significance of an exact date – the *first* day in the last menstrual period (Fig. 1) – indicates a close connection with literacy. Hence, this specific way of labelling the onset of the pregnancy is a relatively new phenomenon. However, it is not universal to define the start of pregnancy by the *first* day of the last menstrual period. In old Irish reports, the estimated date of confinement was calculated from the last rather than the first day of the last menstrual period[5]. Immigrant Turkish and Pakistani women mention the last menstruation as the start of pregnancy. However, some Pakistani women refer to the last day, as they use an ablution after the end of menstruation as a marker, while others may use the first day of the menstrual period[6,7]. This complicates comparisons over time and between different populations.

It may be argued that the time of ovulation constitutes a more precise indicator of onset of a pregnancy (Fig. 1). Registration of physical changes associated with ovulation (increase in body temperature, changes in the vaginal fluid, and small stabs of abdominal pain) is commonly used in cases of sub- or infertility. Such experiences have never been applied to women in general, and often the woman's thoughts about a possible correlation between ovulation and conception are disregarded in favour of the last menstrual period as the determinant factor.

Folk Models

Folk models are the explanatory models used by the people. They indicate what was considered important in the past. But we retain some or part of the folk models and their rationality in the models we use today: cultural forms have "an inertia that survives, often through several generations"[8].

In most cultures pregnancy is not an isolated phenomenon but is considered part of a social transition. Hence, pregnancy is part of a passage into a new social status – "the motherhood" – comprising pregnancy, birth, and maternity (Fig. 1).

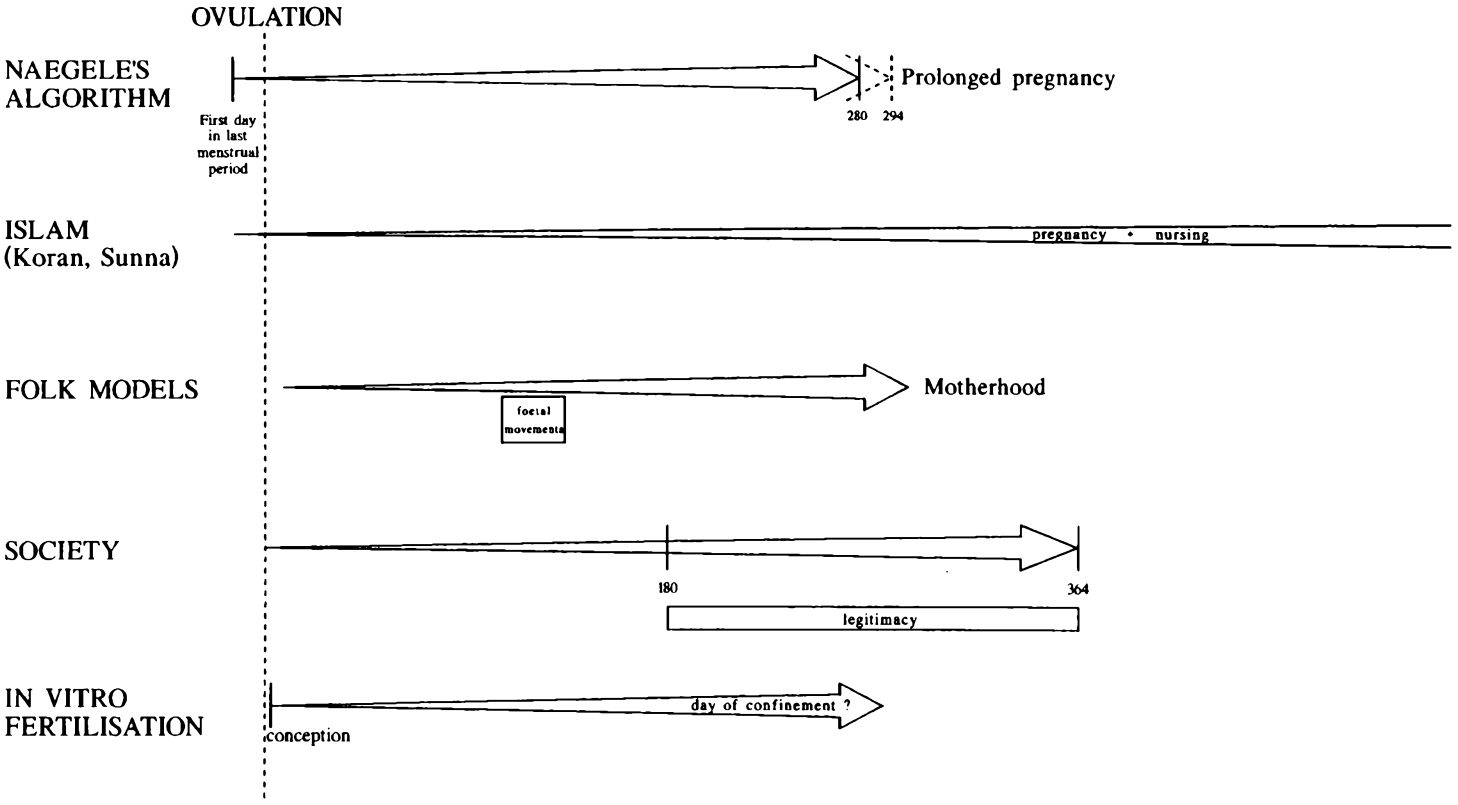

Fig. 1. The duration of a human pregnancy. Different aspects of estimation.

What actually happens with or in the woman during pregnancy – including the length of pregnancy – is not interesting on its own.

Within Islam (in accordance with the Koran and the Sunna) the duration of pregnancy is defined as the length of pregnancy and nursing together (Fig. 1). "His (the child) bearing and weaning are thirty months"[9]. Thus, the estimation includes breastfeeding, which is said to last for 24 months. Some immigrant Islamic women believe that pregnancy lasts 9 months (Pakistani) and others mention 9 months and 10 days (Turkish)[6,7]. This suggests a difference between official ideology (Islam) and folk models (the women).

In traditional peasant societies (here referring to Scandinavia) the duration of pregnancy was used to estimate the time of confinement. The delivery was expected 20 weeks after the day when the child had "become alive", i.e. after the first foetal movements had been felt by the mother (Fig. 1). Pregnancy was sometimes euphemised as "wearing a 40 week apron" or "play in the 40 weeks lottery". However, the confinement was expected 40 weeks "from the day when one had first realised that menstruation had not happened"[10], which moves the apparent onset of pregnancy 4 weeks forward to the time when the next menstruation was expected (Fig. 1). Consequently, the duration of pregnancy according to the folk models was considered approximately 4 weeks longer than the estimation based on Naegele's rule.

In conclusion, on one hand the folk models stress continuity and unity (pregnancy, birth, and maternity). On the other hand there is also a time reckoning in relation to pregnancy length including the number 40. Regarding the transformation of pregnancy into a medical phenomenon[11], it seems as if part of the tradition (the forty) is maintained while the integrated whole is split up (pregnancy versus motherhood).

Societal and Legal Aspects

The duration of a pregnancy is of special importance in patrilineal societies (societies in which inheritance is traced only through males). The societal interest is on the legitimacy of a child and the child's right to inherit its father. The question is how soon after a marriage a newborn is considered to be born in wedlock or how long after the father's absence or death a child could still be considered legitimate at birth. Antiquity shows such contemplations[12]. They exist within all patrilineal societies and traditions such as Judaism, Christianity, and Islam.

The French and Islamic legal systems state 6 months as the lower limit for legitimacy (Fig. 1)[9]. According to European legal decisions, a legitimate child could be born as late as 364 days after separation of the parents[9]. Apparently, the law suits have focused on the change in the social relations, the departure or the death of the father, and only little interest is given to the dating and the duration of the pregnancy. Hence, none of the legal systems want to put fixed limits to the duration of a pregnancy; they rather judge each case on its own merits.

In the old days, with respect to children born out of wedlock, production of evidence of fatherhood rested mainly on the woman. The verdicts considered the probability of a sexual relationship ("the laying"), while dating and pregnancy

length were of minor significance[13]. Today, in most Western societies such proceedings are executed by the state. Tests to prove paternity, irrespective of the man's consent, have been developed and are legally accepted. This underlines the irrelevance of pregnancy length in the legal context.

Medical Aspects

Hippocrates is commonly regarded as the father of medicine. His works do not comprise reflections about the duration of pregnancy since in his epoch human reproduction was of no medical interest. However, in a comment, Hippocrates points out that a child born in the 8th (lunar) month of pregnancy would not survive[14]. The source of this reflection is the legend in Herodotus Book VI, in which the fatherhood of the dethroned King Demaratos in Sparta is discussed.

The medical attention to pregnancy length emerged during the past three or four decades, together with the improvements in antenatal care and neonatology. Probably it developed in order to differentiate between prematurity and retarded foetal growth ("small for gestational age") in cases of low birthweight. However, the development of ultrasonic technology as a non- invasive way to examine the foetus undoubtedly motivated the medical professionals to focus on gestational age.

It is important to realise that the initial purpose of an ultrasonic examination in early pregnancy is to establish the gestational age (the dating equation), apart from the identification of a living foetus, recognition of the number of foetuses, and eventually diagnosis of malformations. This is done essentially to facilitate ultrasonic observation of sufficient foetal development *later* in pregnancy, because the fixed gestational age forms the independent variable to which the measured foetal dimensions relate (the growth equation)[15]. However, in the clinical management of pregnancy the ultrasound examination is often used to confirm the day of confinement. This procedure incorporates the use of Naegele's algorithm in an advanced supervision of pregnancy development based on technology. Consequently, both the pregnant woman and the professionals are provided with a technologically confirmed specific day of confinement based on cultural traditions as to pregnancy length. This exemplifies the conflict between the two paradigms in relation to duration of human pregnancy.

Estimating the gestational age is of special relevance in relation to prolonged pregnancy because the label "prolonged" implies recognition of the duration of pregnancy. The WHO definition considers a rather wide variability in pregnancy length[1]. However, a generally accepted definition of "prolonged" is that the pregnancy exceeds 42 completed weeks of gestation. Accordingly, the label of a pregnancy changes from "normal" to the pathological "prolonged" 2 weeks after the calculated day of confinement despite evidence of associations between pregnancy length and parity, racial, ethnic, and even social factors[5,16]. This is of special importance since the 42 weeks' gestation is often used as a threshold after which labour should be induced[16]. It exemplifies another aspect of the conflict between the concept of pregnancy length and the exact dating based on technology.

Conclusion

The present paper argues that the 280 days or 40 weeks or 10 "moon months" duration of a human pregnancy is a cultural and social concept which over time has had profound medical implications. One may say that the medical professional has carried with him his cultural luggage and turned it into a medical "fact". Thus, the concept of the 280 days duration of pregnancy is taken for granted both by the pregnant women and by the professionals; consequently it is rarely questioned.

In view of the improving technology, the confusion between the concept of pregnancy length and the exact dating must be considered. Hence, technology should be used to focus on pregnancy development rather than to categorise deliveries and pregnancy outcome according to a nomenclature which includes the concept of pregnancy length. Deliveries and pregnancy outcome should be evaluated in relation to the estimated gestational age, avoiding the labels preterm, term, and prolonged (post-term). Gestational age must of course be registered but in accordance with its defined starting point (first day in last menstrual period, day of ovulation, day of conception), its reliability (menstrual history, ultrasound investigation, in vitro fertilisation), and the units of measurement (days, weeks, months). This will facilitate the examination of possible gradients in obstetric outcome as the pregnancy proceeds[15].

A re-evaluation of old and generally used concepts, such as the one analysed in this paper, always brings chaos to existing order. Re-evaluation "... is an act too often neglected," says the fox in "The little Prince"[17]. But re-evaluation may also be the starting point for a new order. An order which might be less rigid than the existing one by stressing the recognition of biological variations in the duration of pregnancy. An order focusing on continuity instead of specifying terms to distinguish between normal and pathological conditions. An order which forms a better basis for discussing the point at which induction of labour is indicated. In most Western societies the available technology for observing the pregnant woman and the foetus permits a high degree of individualisation of the pregnancy without health risk to the mother or her baby.

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