ABSTRACT

Advancing medical knowledge, improving quality of life and increasing life expectancy have resulted in increased numbers of women deciding to deliver a child over 35 years of age. Infertility in delayed motherhood is associated not only with medical but also with psychological problems. The question of delayed motherhood concerns the whole world, and is of interest not only to obstetricians, but also to economists and demographers. The purpose of our study was to identify and review studies into the health problems of women over 35 years of age in pregnancy (Advanced Maternal Age), delivery and the puerperium.

Original papers investigating health problems in women over 35 years of age related to pregnancy, childbirth and the puerperium published between August 2017, and January 2018 were identified. Databases including PubMed, Scopus, ProQuest Central, and Elsevier Clinical Key Journals were utilised. After removing duplicates and those not meeting inclusion criteria, 15 studies were reviewed.

Findings are discussed according to three time periods; before pregnancy, during pregnancy, and during childbirth and the puerperium. AMA mothers, especially primiparous women, were more likely to suffer with underlying chronic diseases and were more likely to have been treated for infertility. Increased use ART (Assisted Reproduction Techniques) can explain an increased rate of multiple pregnancies and the resultant rise in both caesarean section deliveries and premature births. Study groups subclassified according to maternal age allowed outcomes which are progressive with age to be identified. All the studies we reviewed have reported similar health problems in women over 35 years of age.

The most common health problems in pregnancy, during childbirth and the puerperium in women over 35 years of age are diabetes mellitus type one and two, hypertension, preeclampsia, and cholestasis.

KEYWORDS: literature review, pregnancy, childbirth, puerperium, advanced maternal age

BACKGROUND

Improving quality of life and increasing life expectancy, have increased the number of women who decide to deliver a child at an ‘advanced maternal age’ (AMA), that is, over 35 years old. Problems resulting from delayed motherhood can be seen the world over, and are of interest not only to obstetricians but also to economists and demographers [1,2].

Advancing medical knowledge allows women over 35 to maintain good health, especially those suffering from chronic diseases such as diabetes and hypertension. However, age naturally leads to decreased fertility, which may result in difficulties in achieving and retaining a healthy pregnancy. Pregnancy at AMA also carries a higher risk for the child, through an increased rate of birth defects and chromosomal abnormalities as well as multiple pregnancy, premature delivery and low birth weight. Infertility resulting from delayed motherhood is associated not only with medical but also with psychological problems. Reports from various countries...
describe significantly increased health problems during pregnancy, delivery and the puerperium among AMA mothers when compared to younger mothers [3,4].

The progress of modern medicine, including the development of ART (Assisted Reproduction Techniques) methods, has extended the limit of fertility beyond the menopausal age. Advanced ART techniques such as oocyte donation and micromanipulation can allow older women to deliver a healthy child [3,4].

Advanced maternal age presents a challenge not only for optimising pregnancy and neonatal outcomes, but also suggests an important role for doctors, nurses and midwives, in the education of young women to reduce delayed motherhood.

AIM OF THE STUDY

The purpose of our study was to undertake a systematic review of the literature to identify health problems encountered by AMA women during pregnancy, delivery and the puerperium.

MATERIAL AND METHODS

A systematic review of the literature was conducted from August 2017, through to December 2017. We performed the review using the following databases: Pub-Med, Scopus, ProQuest Central, and Elsevier Clinical Key Journals. Search terms included the key words „advanced maternal age”, „after 35 years of age”, „pregnancy”, „childbirth”, „postpartum” combined with: new-born, fertility, infertility, ART, prenatal diagnosis, delayed maternity, high risk factors.

Results were limited to quantitative studies on the health problems of women over 35 years of age in pregnancy, delivery and the puerperium published during last 10 years in a peer-reviewed journal in the Polish or English language. Articles where there were no data from pregnancy, delivery or the puerperium, or did not include a distinct group of mothers over 35 years of age, were excluded. The search process is presented in fig. 1.

RESULTS

The table below shows the specific characteristics of the country, study dates and the main topics of the papers included in our review.

Health problems identified in research studies are discussed in terms of their timing: before pregnancy, during pregnancy, or during childbirth and the puerperium.

Before pregnancy

AMA mothers, especially primiparous women are more likely to be suffering from chronic diseases such as hypertension or diabetes mellitus type 2 [5,6]. A significant increase in the incidence of maternal hypertension was seen with age greater than 45 years [7]. The studies identified a higher prevalence of a history
### Table 1. Characteristics of included studies.

<table>
<thead>
<tr>
<th>Study (reference)</th>
<th>Country / Year of publication</th>
<th>Data collection period</th>
<th>Participants</th>
<th>Groups</th>
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<tr>
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<tr>
<td>Advanced maternal age and pregnancy outcomes: a multicountry assessment. [12]</td>
<td>29 countries in Africa, Asia, Latin America, and the Middle East. (developing countries and Japan), 2014</td>
<td>05.2010 - 12.2011</td>
<td>Singleton pregnancies, n = 308,149.</td>
<td>20-34 years = 238,504, 35-39 years = 29,248, 40-44 years = 7,015, ≥45 years = 1,527.</td>
<td>The association between advanced maternal age and adverse pregnancy outcomes.</td>
</tr>
<tr>
<td>Advanced Maternal Age and Risks for Adverse Pregnancy Outcomes: A Population-Based Study in Oman. [14]</td>
<td>Oman, 2015</td>
<td>2000</td>
<td>Married, primiparous and multiparous women n = 1,345</td>
<td>20-34 years (reference group) n = 10,300, ≥35 years n = 3,135.</td>
<td>Investigate if advanced maternal age of 35 years or more is a risk factor for adverse outcomes in pregnancy after controlling for the effects of potential confounding factors.</td>
</tr>
<tr>
<td>Obstetric and perinatal outcomes in women ≥40 years of age: Associations with fetal growth disorders. [15]</td>
<td>Spain, Barcelona, 2016</td>
<td>06.2009 - 06.2012</td>
<td>Singleton pregnancies, n = 11,328.</td>
<td>&lt;35 years n = 7,888, 35-39 years n = 2,781, ≥40 years n = 654.</td>
<td>Evidence indicates that advanced maternal age is associated with adverse obstetric and perinatal outcomes.</td>
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<tr>
<td>At what age does the risk for adverse maternal and infant outcomes increase? Nationwide register-based study on first births in Finland in 2005-2014. [16]</td>
<td>Finland, 2016</td>
<td>2005-2014</td>
<td>Primiparous singleton pregnancies, n = 228,348.</td>
<td>20-24 years (reference group) n = 58,282, 25-29 years n = 86,540, 30-34 years n = 60,716, 35-39 years n = 20,501, 40-44 years n = 41,113, ≥45 years n = 196.</td>
<td>Examine at which maternal age the use of maternity care and the risks for adverse maternal and infant outcomes increase.</td>
</tr>
<tr>
<td>Twin pregnancies after assisted reproductive technologies: the role of maternal age on pregnancy outcome. [17]</td>
<td>Italy, 2016</td>
<td>01.2010 - 11.2014</td>
<td>Nulliparous, dichorionic diamniotic twin pregnancies conceived with ART, n = 430.</td>
<td>&lt;40 years n = 265, ≥40 years n = 165.</td>
<td>Investigation of whether advanced maternal age (40 years) still impairs the outcome of twin pregnancies after assisted reproductive techniques.</td>
</tr>
</tbody>
</table>
Pregnancy, childbirth and puerperium health problems in women after 35 year of age: a systematic literature review

of miscarriages [6,7] and stillbirth [9,10]. In addition, this group of women were more likely to have planned the pregnancy [11], have been treated for infertility, undergone gynaecological surgical interventions in the past [8] or used ART [6,11,12,13].

During pregnancy:

Amongst AMA women the most frequent health problems in pregnancy were: gestational diabetes mellitus type 1 and 2 [5,8,10–12,14–17], hypertension [10,11,17], preeclampsia [7,10,15] and cholestasis [8,11]. The incidence of respiratory infections, urine infections and anaemia was also higher [8]. With advancing age the risk of placenta praevia increases [7,8,17]. Rising numbers of miscarriages [15] and antepartum haemorrhage [7] are also seen. In AMA primiparous women preeclampsia [13] and IUGR [8,13] occur more often, while in multiparous women preeclampsia, placenta previa, hydramnion and oligohydramnion are more likely [12].

During delivery:

Among women giving birth after the age of 35, the percentage of preterm births [8,10,18] especially those due to multiple pregnancy [6,7] and other delivery complications [10] increases. Emergency [5,15,16] and elective [8,9,11,15] caesarean section are more common than natural delivery [8,7,10,12,14,17]. The main indications for assisted delivery are advanced maternal age and previous surgical interventions, such as myomectomy [8]. In the primiparous group delivery induction and epidural anaesthesia occurred more often [14], while amongst the multiparous group malpresentation, cephalopelvic disproportion, non-progressive first stage of labour and, fetal distress in the second stage of labour, were reported [12]. In these publications there were no statistical differences in birthweight or Apgar score [8,11,16]. However, it was shown that ART pregnancies in women over 40 years of age are at a higher risk of obstetric and neonatal complications than pregnancies after natural conception in women in the same age group [6].

During the puerperium:

Only two publications mention complications in the time after childbirth. These papers report an increased risk of maternal death [11] and prolonged postpartum hospital stay ≥7 days [17] in AMA mothers.

Discussion

This is the first literature review of health problems in women over 35 years of age occurring in pregnancy, delivery and the puerperium. Studies included in our review were performed in developed [6–9,11,14–17] and in developing countries [5,10,12,13,18,19]. In only one study there were data from more than one country (Africa, Asia, Latin America, and the Middle East) [18]. All studies reported similar findings.

We identified only one study which compared the outcomes of ART and non-ART AMA mothers. This study reported a higher initial BMI and a lower incidence of smoking in non-ART mothers [13].

Study groups defined according to maternal age allowed the examination of outcomes which are progressive with age [7,12,15]. For maternal risk factors, threshold-ages of 25 years for diabetes, 33 years for hypertension, 38 for preeclampsia, 27 for placenta previa and 36 for perinatal mortality were defined [17].

The studies are not without discrepancies, for example some studies indicate no significant variation between the first and second stages of labour among AMA women [8] while others found differences [12]. Such discrepancies may perhaps be explained by the lower number of participants in some studies.

There was also variation among the investigated variables between papers. Earlier studies concentrated more on sociodemographic details (including level of education, smoking, use of alcohol, BMI) [5,7–9,11,12,14,15,18] while more recent papers focus on factors such as comparing ART use between primiparous and multiparous women [13]. The use of ART causes a twelve times increased frequency of multiple pregnancy, with a resultant rise in, caesarean section and premature birth [7].

Limitations of the studies include missing data in big, cohort or population-based studies [9,12–14,19] whereas in single-centre studies the authors noticed that although the results varied somewhat with the referral level of the hospital [5,8,11,15,16], trends were similar. Only a few studies comment on health problems in the early postpartum period, and all focus on the period of hospitalization. We did not identify any publications investigating the late puerperal period, particularly in the area of postnatal depression or other late complications of the puerperium.

Conclusion

The most common health problems during pregnancy and delivery in women over 35 years of age are diabetes mellitus type 1 and 2, hypertension, preeclampsia and cholestasis. There is a significant increase in preterm birth and caesarean section in this group. Owing to widespread use of ART, there is an increased risk of multiple pregnancy. Increased risk of maternal death and prolonged hospital stay ≥7 days are the most frequently reported problems in the puerperium.

References

3. Sauer MV. Reproduction at an advanced maternal age and

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