



The prevalence of Mycoplasma in the reproductive tract of women who are not pregnant ranges from less than one percent to several percent. The prevalence in pregnant women is higher and carries the risk of complications, which include premature rupture of membranes (PROM), preterm delivery, low birth weight of the neonate, postpartum infection and respiratory diseases in the newborn, puerperal fever in the mother.

The Prevalence Of Mycoplasma In Pregnant Women's Genital Tracts Delivering In TERTIARY Hospital

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ABSTRACT

Background: The aim of this study was to evaluate the prevalence of Mycoplasma hominis and Ureaplasma urealyticum among pregnant women and an attempt to identify risk factors for maternal infection and assessment of the impact of infection on perinatal outcomes.

Material and methods: Patients included into the analysis were divided into 2 groups. The first group consisted of 97 (78.9%) women who had not isolated the strains of Mycoplasma, and the second group of 26 (21.1%) women who had isolated a strain of Mycoplasma.

Results: Women who had isolated strains of Mycoplasma were significantly younger ($p=0.0031$), less frequently completed higher education ($p=0.0163$), less frequently were married ($p=0.0061$). Women who were not classified with Mycoplasma were more frequently multiparas ($p=0.012$) and were more likely to have previous caesarean birth ($p=0.022$). The groups did not differ significantly in terms of gestational age at birth, the incidence of premature rupture of membranes, intrauterine infection, the percentage of women who gave birth vaginally, the birth weight of newborns and the condition of the newborns after delivery. The neonatal respiratory support type nCPAP was more frequently applied to the babies born to mothers who had isolated Mycoplasma.

Conclusions: Based on the survey results and data from the world literature, it can be concluded that women with pre-term labour and PROM should be tested for Mycoplasma colonization and the newborn should be observed primarily in terms of complications caused by respiratory tract. Colonization with Mycoplasma in term pregnancy does not impact significantly maternal and neonatal outcome.

BACKGROUND

Mycoplasma hominis and Ureaplasma urealyticum create a large family of Mycoplasmataceae, of which only a few strains infect humans. Mycoplasma hominis was first isolated in 1937 from the Bartholin's gland abscess [1], and Ureaplasma urealyticum in 1954 from a man with non-gonorrhoea caused urethritis [2]. Since then, many studies demonstrated the relationship of both pathogens with the urogenital tract infections. The prevalence of Mycoplasma in the reproductive tract of women who are not pregnant ranges from less than one percent to several percent [3, 4, 5, 6]. The prevalence in pregnant women is higher [7] and carries the risk of complications, which include premature rupture of membranes (PROM), preterm delivery, low birth weight of the neonate, postpartum infection and respiratory diseases in the newborn, puerperal fever in the mother [8].

The aim of this study was to evaluate the prevalence of Mycoplasma hominis and Ureaplasma urealyticum among patients admitted to the 2nd Department of Obstetrics and Gynaecology of Medical University of Warsaw and an attempt to identify risk factors for maternal infection and assessment of the impact of infection on perinatal outcomes of newborns and their mothers.

MATERIAL AND METHODS

140 pregnant women with gestational age of 22 to 41 weeks of pregnancy admitted to the hospital in the period from 14th of Dec 2015 to 11th of Jan 2016 had the swab of the uterine cervix or vagina taken to be examined for Mycoplasma hominis and Ureaplasma urealyticum infection. After admission to the hospital the data regarding the patient's medical history were collected, general medical and obstetric examination was performed and the information from the pregnancy card was obtained. Each patient after the admission had also endocervical swab taken to make the microbiological assessment.

The method of pathogen identification

To identify pathogens, Mycoplasma IST 2 test was used, which is a complete kit for the diagnosis of mycoplasmal infections of urogenital tract. It allows for breeding, identification, and evaluation of the quantity and susceptibility of infections caused by Ureaplasma spp. and Mycoplasma hominis. The test is a combination of broth culture with the test strip containing 22 designations. The applied broth guarantees optimal growth conditions for mycoplasmas (pH, nutrient substrates, a mixture of several growth factors). The specific substrates present in the broth (urea for Ureaplasma spp. and arginine for Mycoplasma hominis) and the indicator (phenol red), cause a colour change attributable to the increase in pH, if the culture is positive. The selectivity of the culture,

achieved thanks to the content of one of three antibiotics and one antifungal medication ensures that any additional bacterial flora present in the sample does not distort the test. After inoculation the broth is applied to the test strip, which simultaneously enables the identification, evaluation, and semi-quantitative sensitivity to the following antibiotics: doxycycline, josamycin, ofloxacin, erythromycin, tetracycline, ciprofloxacin, azithromycin, clarithromycin, and pristinamycin.

17 patients were excluded from the analysis: 7 patients in twin pregnancy, three of which had Mycoplasma isolated; 1 patient admitted to the hospital due to intrauterine death, who had no Mycoplasma isolated and 8 patients who did not deliver during their stay in the hospital, two of which had Mycoplasma isolated and 1 patient in whom it was not possible to perform the test for technical reasons.

Ultimately, 123 patients included into the analysis were divided into 2 groups. The first group (control group) consisted of 97 (78.9%) women who had not isolated the strains of Mycoplasma hominis and Ureaplasma urealyticum, and the second group (study group) of 26 (21.1%) women who had isolated a strain of Mycoplasma hominis and/or Ureaplasma urealyticum. 18 patients from the second group had isolated only the strain of Ureaplasma urealyticum, and the remaining 8 had isolated both Ureaplasma Urealyticum and Mycoplasma hominis. Among all pregnant women included in this analysis, 9 were admitted to the hospital below 36 weeks of pregnancy (22 to 35 weeks); 2 of them (22.2%) had isolated Mycoplasma. 2 of pregnant patients admitted to the hospital prematurely presented PROM, 1 of which had isolated Mycoplasma, the remaining 7 patients had intact membranes.

Women in both groups were compared in terms of age, place of residence, socioeconomic status, education, marital status, anthropometric parameters (pre-pregnancy body weight, weight gain during pregnancy, current body mass index - BMI), gynaecological and obstetrical history (parity, history of caesarean section, miscarriages, preterm deliveries, infertility treatment, use of contraception, in vitro fertilization) and presence of diseases (pre-pregnancy hypertension and pregnancy induced hypertension, pre-pregnancy and gestational diabetes, hypothyroidism, anaemia, the presence of pathogens in the cervical canal on admission to the hospital). The groups were compared in terms of frequency of pregnancy complications (cervical insufficiency, premature rupture of membranes, threatened preterm labour, vaginal bleeding) and delivery results (gestational age at delivery, the method of the delivery, the use of antibiotics during labour, the diagnosis of intrauterine infection, the maximum count of leukocytes during labour, birth weight and length of the neonates, postpartum Apgar score, need for respiratory support: nasal continuous positive airway pressure

- nCPAP or intubation, diagnosis of infection in the newborn and in the mother in puerperium). The first and the second group were also compared in terms of pathogens, which were most often isolated in the bacteriological culture from the birth canals of the studied women.

In addition, a group of women who had isolated Mycoplasma was divided into those who were treated before the delivery according to antibiogram (clarithromycin or azithromycin) and those that were not treated before delivery because delivery took place before receiving a positive test result. These groups were compared in terms of perinatal outcome (gestational age at childbirth, the frequency of vaginal deliveries, postnatal Apgar scores, need for respiratory support nCPAP or intubation, diagnosis of infection in the newborn and in the mother in puerperium).

Statistical analysis

To compare the means, medians and percentages, Student-T test, U-Mann-Whitney test and Fisher test were used, respectively. The statistical analysis was performed on the basis of manuals by L.D. Fisher and Gerald van Belle [9] and the SAS system [10].

RESULTS

The characteristics of the mothers is shown in Table 1. Women who had isolated strains of Mycoplasma hominis and/or Ureaplasma urealyticum were significantly younger (29.1 ± 5.26 vs 32.4 ± 4.46 years; $p=0.0031$), less frequently completed higher education (57.7% vs 82.1%; $p=0.0163$), less frequently were married (57.7% vs 84.4%; $p=0.0061$) compared to women who had not isolated those pathogens. Anthropometric parameters did not differ significantly between the groups.

When analysing the gynaecological and obstetrical history, it was found that women who were not classified with Mycoplasma were more frequently multiparas (61.9% vs 32.0%; $p=0.012$) and were more likely to have previous caesarean birth (17.5% vs. 0%; $p=0.022$).

The two groups did not differ significantly in terms of abnormal results of the cultures of the cervical canal taken at the admission to the hospital and in terms of species of the isolated strains (Table 2). The abnormal cervical canal culture result was found in the group of 8 patients (30.8%) with positive result of Mycoplasma; in the group of 5 of them one pathogen was detected and in the group of 3 of them several pathogens were found. The most frequently isolated strains were Group B Streptococci (GBS) and Candida albicans. The abnormal cervical canal culture result was found in the group of 26 women (26.8%) with negative result of Mycoplasma; in the group of 18 of them one pathogen was detected, and in the group of 8 of them several pathogens were found.

Most of these women had isolated GBS strains and Candida albicans, similarly to the first group. Perinatal outcomes of mothers and newborns are presented in Table 3. The groups did not differ significantly in terms of gestational age at birth, the incidence of premature rupture of membranes, intrauterine infection, the percentage of women who gave birth vaginally, the birth weight of newborns and the condition of the newborns after delivery. The neonatal respiratory support type nCPAP was more frequently applied to the babies born to mothers who had isolated Mycoplasma (19.2% vs. 6.2%; $p=0.053$). In the group of 9 patients admitted to the hospital with pregnancies before 36 weeks of pregnancy, six of them gave birth prematurely (below the 36th week), including 1 woman with the isolated Mycoplasma.

There were no statistically significant differences in the perinatal results in mothers and newborns, when comparing women with positive test of Mycoplasma, who were treated and those who were not treated (Table 4).

DISCUSSION

The incidence of vaginal colonization with Ureaplasma urealyticum strain ranges from 8.5 to 77.5% [13]. The strain can be included in the normal genital flora [14]. However, the organism can also cause inflammation. Ureaplasma urealyticum appeared in 16% of patients with non-gonorrhoea-related urethritis [15], 25.8% of patients suffering from genital tract infections and in 20.8% of infertile women [16]. According to the Greek data, the frequency of appearance of Ureaplasma strain in non-pregnant women was 25.3% and for Mycoplasma hominis was 3.7% [11]. The authors from Saudi Arabia indicate the frequency of strain U. urealyticum/parvum appearance of 9.6% [12]. According to the study conducted by Australian authors, the frequency of UU and MH colonization in women coming to sexual health clinic amounted to 6.1 and 13.7%, respectively [6].

According to Taylor-Robinson and Munday, the frequency of Ureaplasma urealyticum and Mycoplasma hominis strains incidence of infection is higher in pregnant women than in those who are not pregnant [7]. According to the Czech authors, in women with PROM UU colonised the cervix in 68% compared to 17% in the control group and MH colonised in 28% compared to 15% in the control group [17]. The Belgian study, which analysed the incidence of preterm birth in women in Brussels showed that women who gave premature birth in almost 54% were colonized by UU [18]. The incidence of UU and or MH among our patients was 21%, which is comparable to that showed in the above studies in control groups, which is understandable, since most of the women in our study were in term pregnancies and only 9 of them (8%) in less than 36 weeks pregnancy, of whom in only 2 of them PROM was present.

In our study, we found that the colonization by UU and MH is more common in younger women, less educated and unmarried, which is consistent with the results of other authors [20].

Rosenstein and his colleagues [21] found that MH more frequently colonizes the women with Bacterial vaginosis. According to our data, the patients who had isolated UU or MH did not differ from the control group in terms of the most commonly cultured bacteria from the genital tract under the conventional microbial inoculation.

According to data from the world literature, the UU colonization of the genital tract in pregnancy carries a higher risk of preterm birth [22, 23]. In our study, women in the study group and the control did not differ in terms of gestational age at birth, but this should be checked in the larger study group.

Many scientific studies raise the issues of the importance of colonization by *Mycoplasma* during pregnancy as a risk factor for low birth weight of an infant, although the results of the studies are not conclusive [24,25,26]. Our results do not confirm such relation, infants in the study group and the control group did not differ in birth weight.

The presence of UU in the lower respiratory tract of the newborns, in particular the one born prematurely, with low birth weight may lead to pneumonia, chronic lung disease, bronchopulmonary dysplasia and even death [27,28,29]. In our study, we have not found this type of complication, although the vast majority of infants in our study was born close to term. However, it shall be remembered that even full-term newborns, delivered by the colonized mothers often required the respiratory support, type nCPAP as compared to the control group.

Mycoplasma colonization increases the risk of fever in puerperium and after miscarriage [30]. In our study, we found no such relationship. Women from both groups did not differ significantly in terms of incidence of postpartum infection.

According to Voug and co-authors [20], the treatment of pregnant women colonized by *Mycoplasma* reduces the risk of preterm birth and neonatal complications. Analysing the perinatal outcomes in women colonized with UU or MH, treated according to antibiogram and those who were not treated, we found no differences, but because of small groups as well as the fact that most of the women in our study delivered at term, the conclusions should be drawn carefully.

CONCLUSIONS

Based on the survey results and data from the world literature, it can be concluded that women with pre-

term labour and PROM should be tested for *Mycoplasma* colonization; after confirming colonization during pregnancy, the treatment should be applied in accordance with the antibiogram and the newborn should be observed primarily in terms of complications caused by respiratory tract. Colonization with *Mycoplasma* in term pregnancy (as were most patients in our study) does not impact significantly maternal and neonatal outcome.

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