EPIDEMIOLOGY AND PREVALENCE OF LISTERIA MONOCYTOGENES ABORTION: A SYSTEMATIC REVIEW

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ABSTRACT

Background and Aim: Listeria monocytogenes was recognized as a foodborne pathogen in the 1980s and causes severe infections such as meningoencephalitis and sepsis with about 25% mortality. This rate is up to 50% in infants. Listerialiosis is increasingly recognized as a serious health threat.

Methods: This was done by systematic review. Studies were collected using different keyword combinations: Listeria monocytogenes, Pregnancy, Listeriosis in domestic and foreign scientific databases, Elsevier and Pubmed, Science Direct, Web of Science, google scholar, Iranmedex, SID, Magiran and Scopus. Out of 80 articles reviewed, 51 articles were evaluated and analyzed to extract data. The aim of this study was to evaluate the prevalence of listeria miscarriage and the epidemic of this bacterium in pregnant women in Iran.

Results: Listeriosis is especially severe in immunocompromised individuals and pregnant women. Although the disease has a low prevalence, the mortality rate is high among infected people. In pregnant women, listeriosis can cause miscarriage, fetal death, or neonatal disease such as sepsis and meningitis.

Conclusion: Little research has been done on pregnant women with Listeria monocytogenes as well as infectious abortions in Iran. And in Iran, bacterial abortions are less considered, examinations and sampling after abortion of the fetus and for clinical and laboratory studies of the mother, especially bacterial culture and more detailed and comprehensive studies in areas with higher abortion rates, is necessary.

Keywords: Abortion, Listeria monocytogenes, Pregnancy, Listeriosis

I. INTRODUCTION

Listeria is a gram-positive bacterium with a global prevalence. With a small amount of C + G, which is seen as a rod, anaerobic and without spores [1]. The genus Listeria has several species, of which Listeria monocytogenes is of particular importance as an opportunistic human and animal pathogen [1]. L. monocytogenes, as the main cause of listeriosis in humans, is an intracellular bacterium that has the ability to infect a wide range of cell types and pass through the intestine, blood-brain barrier and placenta [2]. In humans, listeriosis can range from mild and self-limiting diseases such as influenza or febrile gastroenteritis in healthy individuals to severe systemic infections including meningitis, sepsis, and miscarriage in pregnant women [3] High-risk individuals: pregnant
women, infants, the elderly have immunodeficiency and adults with malignant cancers [4]. Hormonal changes during pregnancy stimulate several physiological changes aimed at the growth and delivery of a healthy baby. An accurate balance must be struck between immunity to fetal antigens and immunity to infectious agents. A tripartite interaction is now emerging between our pregnancy hormones, our immune system and our microbiota. Recent evidence suggests that microbial changes seen during pregnancy may help maintain homeostasis and contribute to the physiological changes required during pregnancy. However, these same immune and microbial changes may make women vulnerable during pregnancy and the postpartum period, especially in the case of immune and infectious diseases [67]. Changes in Iranian food tastes lead to the consumption of different types of food that may be known as a risk factor for the spread of listeriosis. Despite some local information on the prevalence of Listeria in food sources in Iran, there is no comprehensive information on the prevalence of L. monocytogenes to estimate the time available [3].

II. MATERIALS AND METHODS:
The present study was performed by systematic review. To access the desired articles from domestic and foreign databases such as Elsevier, Pubmed, Science Direct, Iranmedex, Magiran, SID, Scopus, Web of Science and google scholar. used. Search for articles using existing mental health studies on the Covid 19 pandemic using the keywords "new corona virus", "COVID-19", "nCoV", mental health, post-traumatic stress disorder, anxiety, depression Mental health and stress and General Papulation, Anxiety Depression, Post-traumatic disorder was performed in the period 2019 to 2021.

Research that has the desired keywords and in the field of COVID 19 disease and its impact on mental health in English and Persian, were studied. The articles of internal databases were also studied by review method from March to July 1400. In addition, the articles that were published online on the who site were also studied, and finally, 155 articles were reviewed.

Inclusion and exclusion criteria:
In this study, articles with the desired keyword and the prevalence of abortion caused by Listeria monocytogenes were included in the study and in this study there were no language restrictions.

The process of reviewing and selecting research articles:

<table>
<thead>
<tr>
<th>Identify articles</th>
<th>Articles found in the target databases 80 articles</th>
</tr>
</thead>
<tbody>
<tr>
<td>Screening</td>
<td>Remove duplicate articles 10 articles</td>
</tr>
<tr>
<td>Eligible Articles</td>
<td>Select articles based on inclusion and exclusion criteria</td>
</tr>
<tr>
<td>Reviewed articles</td>
<td>Full text articles 51 articles reviewed in the research</td>
</tr>
</tbody>
</table>

Sources of infection:
L. monocytogenes infection is a common human-animal disease worldwide that mainly affects herd animals such as cattle, sheep and goats. Listeria organisms are prevalent in the environment and are commonly found in animal feces, soil, decaying vegetation, plants, and creek waters. When an environmental surface becomes infected with Listeria organisms, it is difficult to eradicate or destroy them due to relative resistance. Listeria organisms have the ability to live in biofilms and survive in harsh conditions including a wide range of temperatures (1.5 to 50 °C) and pH ranges of 4.3 to 9.6 [31].

**Mechanism of infection:**

Listeria monocytogenes has the ability to enter host cells, typically mammalian cells such as macrophages, epithelial cells, and gastrointestinal endothelial cells [5]. After swallowing the bacteria, it travels to the small intestine - the first place where the attack occurs - from the mesenteric lymph nodes to the spleen and liver. Because L. monocytogenes can also enter the brain or placenta, they cause central nervous system (CNS)
infections in immunocompromised patients and intrauterine or cervical infections in pregnant women, respectively [6, 7].

Listeria monocytogenes uses a variety of proteins, including some internals, to attach to and attack host cells. When in the intracellular phagocytic vacuole, the bacteria secrete listeriolysin and phospholipase, which allows it to lick the membrane and prevent it from killing inside the cell. Once released into the cytoplasm, L. monocytogenes can proliferate and form actin filaments that allow it to travel through the plasma membrane into the cytoplasm. Adjacent cells are then attacked by the protrusion of the plasma membrane and cell proliferation. Through this cycle, L. monocytogenes can be transferred from one host cell to another without leaving the cell. Therefore, they escape from human T cells and the immune system and attack other cells in tissues [8, 9].

![Figure 1. Schematic of infection of body cells with Listeria monocytogenes](Radoshevich et al. (2018))
Listeria monocytogenes and pregnancy:

Compared to the general population, pregnant women are 10 times more likely to develop listeriosis [28]. About 29% of maternal infections may be asymptomatic or present as a flu-like illness with headache, fever, or myalgia. However, it can have serious consequences such as abortion, stillbirth and preterm delivery [15]. Of these, preterm delivery, with a 64% incidence, is a recurrent complication of listeriosis in pregnant women [29]. In the United States and Europe, about 15% and 18-6% of cases of listeriosis are pregnancy-related, respectively. Babies are usually infected through the mother or during childbirth through the vaginal canal. In addition, infection of the mother's lower genital tract can be another way of transmitting the infection [30].

Listeriosis can cause illness in infants. Granulomatosis infantiseptica often shows up within 7 days of birth and is most commonly reported in infants. Babies with premature disease become infected in the womb through bacteremic mothers and are often born prematurely. Bacteremia (88-81%), respiratory distress (38%) and meningitis (24%) are the most common infections. Usually, in about 5-31% of cases, late infant listeriosis can occur with an average age of 14 days after birth. Cellular immunity is minimal during pregnancy due to an increase in progesterone. Pregnant women to such intracellular microorganisms L. monocytogenes are sensitive [10, 11, 12, 13]. Vertical cell-to-cell transfer is frequent because L. monocytogenes are colonized in the uterus [14].

Infection with L. monocytogenes during pregnancy may lead to serious consequences including miscarriage, stillbirth, chorioamnionitis, preterm delivery, and maternal and neonatal sepsis [15, 16]. The results show that susceptibility to listeriosis increases in late pregnancy. One-third of cases of listeriosis are more common in pregnant women in the third trimester of pregnancy [10, 11, 14].

Listeriosis and premature infants:

Listeria monocytogenes is transmitted through the uterus and placenta and is also known as infectious granulomatosis.

Becomes. This disease can be a deadly infection during pregnancy. However, it may have no specific symptoms and is characterized by meningitis (24%). Abscesses and granulomas may form and spread in different organs.
The mortality rate in living infants reaches 20% and the frequency of abortions and stillbirths brings the overall mortality rate to more than 50% [14, 18, 19, 20, 21, 22 and 23].

Listeriosis and late infants:

Infection, especially during childbirth, occurs with symptoms such as meningitis or septicemia of meningoencephalitis 2 or 3 weeks after delivery. In these cases, the bacteria can be transmitted through the birth canal. Infection with Listeria monocytogenes in cesarean deliveries indicates that the bacterium can also be transmitted to the hospital. Deaths associated with late illness are approximate. As explained by DeWaal et al., a large proportion of surviving infants suffer from severe and chronic neurological complications such as mental retardation and blindness [14, 18, 24, 25, 26, and 27].

III. DISCUSSION:

Listeriosis occurs 18 times more often in pregnant women than in non-pregnant women and 26-27% of listeria infections occur in pregnant women (49). Listeria monocytogenes is an important pathogenic microorganism. This organism is an important opportunistic food pathogen that can cause severe problems, especially in pregnant women, infants, the elderly, and immunocompromised individuals. Table 1 shows the prevalence of food contamination with Listeria monocytogenes. Listeria monocytogenes has been recognized as an important food pathogen in recent years. Although there are other routes of transmission, food is the most important source of infection. The reported incidence of human listeriosis is low compared to other food bacteria such as Campylobacter and Salmonella, but among food bacterial pathogens the listeriosis mortality rate is higher (64).

Among the many factors that are known to cause abortion in women, bacterial infection of the genital tract is one of the most important factors in abortion. Research has shown that genital infections account for 19-25% of abortions in women. The presence of bacterial pathogens in the reproductive system is very important due to the lack of timely detection of the destructive effects they cause. Unfortunately, studies show that in our country, the role of bacterial infections in abortion is not considered much, or in experiments to find hard-growing bacteria and molecular methods are used less in the medical diagnostic laboratory. Among the types of bacterial agents that have the potential to affect abortion, the most common and important are Listeria monocytogenes, Neisseria gonorrhoeae, Mycoplasma and Calmydia. This group of bacteria can play an important etiological role in abortion in women by causing infection in the urogenital tract (65, 66). Table 2 shows the rate of listeria-related abortions.

Maternal and neonatal analysis showed that one-third of mothers with Listeria monocytogenes isolated the bacterium from blood cultures and about half were hospitalized. However, some cases have been observed in pre-pregnancy ages. Its prevalence seems to be exacerbated during pregnancy and in pregnant women (59, 51, 52). Significant reductions in pregnancy-related listeriosis were reported in the United States between 2003 and 2007. Interestingly, increases were reported in Wales and England (110 between 1990 and 1999 versus 191 between 2001 and 2009) (48). In 2014, 675 cases of listeriosis were reported to the Listeria Initiative Monitoring System in the United States, of which 660 (98%) were aggressive [48].

Table 2. Listeria-related abortions

<table>
<thead>
<tr>
<th>Type of infection</th>
<th>year</th>
<th>city</th>
<th>The whole sample</th>
<th>Infection with Listeria monocytogenes(%)</th>
<th>reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spontaneous abortion</td>
<td>2009</td>
<td>Bandar Abbas</td>
<td>450</td>
<td>124 (27.5)</td>
<td>Jamshidi et al.</td>
</tr>
<tr>
<td>Spontaneous abortion</td>
<td>2011</td>
<td>Tehran</td>
<td>100</td>
<td>9 (9)</td>
<td>Lotfollahi et al.</td>
</tr>
<tr>
<td>Pregnant</td>
<td>2011</td>
<td>Tehran</td>
<td>512</td>
<td>5 (0.9)</td>
<td>Rahimi et al.</td>
</tr>
<tr>
<td>Septic abortion</td>
<td>2011</td>
<td>Karaj</td>
<td>87</td>
<td>12 (1.3)</td>
<td>Goudarzi et al.</td>
</tr>
<tr>
<td>Pregnant</td>
<td>2013</td>
<td>Lorestan</td>
<td>100</td>
<td>0 (0.0)</td>
<td>Shakkib et al.</td>
</tr>
<tr>
<td>abortion</td>
<td>2014</td>
<td>Tehran</td>
<td>96</td>
<td>16 (1.6)</td>
<td>Esfami et al.</td>
</tr>
<tr>
<td>Spontaneous abortion</td>
<td>2015</td>
<td>Ahvaz</td>
<td>180</td>
<td>43 (2.3)</td>
<td>Haghroosta et al.</td>
</tr>
<tr>
<td>Spontaneous abortion</td>
<td>2016</td>
<td>Tehran</td>
<td>317</td>
<td>54 (17)</td>
<td>Pourkaveh et al.</td>
</tr>
<tr>
<td>Spontaneous abortion</td>
<td>2016</td>
<td>Tehran</td>
<td>170</td>
<td>14 (8.2)</td>
<td>Pournajaf et al.</td>
</tr>
<tr>
<td>abortion</td>
<td>2017</td>
<td>Tabriz</td>
<td>125</td>
<td>11 (8.8)</td>
<td>Lotfollahi et al.</td>
</tr>
</tbody>
</table>
Due to the fact that Listeria monocytogenes enters the host body mostly through food, especially dairy and meat products, so more research and attention should be done in the field of food hygiene. Especially in foods that are widely consumed in society.

In terms of human infections, especially infections of pregnant women, especially in the critical weeks of pregnancy, it is necessary to perform protocols and screening conditions to diagnose infection with this bacterium during pregnancy. Midwives and obstetricians should educate mothers during pregnancy, especially during the important weeks of pregnancy, to prevent listeriosis.

Unfortunately, our study showed that little research has been done on pregnant women with Listeria monocytogenes as well as infectious abortions in Iran. Due to the fact that bacterial abortions are not considered or less considered in Iran, it is necessary to examine and sample the fetus after abortion for clinical and laboratory studies, especially bacterial culture and its accurate diagnosis. be done. Also, more detailed and comprehensive studies should be performed in areas with higher abortion rates to determine the exact cause of abortion.

**Abbreviations:** L. monocytogenes: Listeria monocytogenes

**Acknowledgments:**

All researchers and scholars are commended for their efforts to reduce miscarriage due to Listeria monocytogenes and to improve maternal health. The entry of articles into the process was reviewed.

**Conflict of interest:**

The authors confirm that there is no conflict of interest in the present study.

**REFERENCES:**


