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Types of Bacteria Contaminating Wounds in Caesarean Sections and the Extent of Their Association with Some Diseases in the Iraqi Province of Babylon

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ABSTRACT

Background: Wound infections are a common cause of hospital admission and are covered by the media. We became motivated to look at the origins of infections as well as the reasons why wound patients end up in hospitals and die because of how crucial it is for health care to contain costs, aim of study to know what types of bacteria were infected caesarean wounds and what types of related diseases related with them. **Methodology:** Samples of caesarean section wounds were collected from 1/2/2023 to 10/6/2023 at Imam Sadiq Hospitals and Al-Hillah Teaching Hospital in Babylon Governorate in Iraq. The bacteria were diagnosed through several biochemical tests for diagnosis and identification. Microscopical, biochemical tests. Results: With hyperthyroidism , we find that *Staphylococcus aureus* bacteria were the most prevalent among different age groups and in varying proportions, as was also the case with anemia, which then came in second place *p. aeruginosa*, but with diabetes, Staphylococcus aureus topped the results, and proteus vulgaris bacteria appeared with it in the second degree, and the results were different with hypertensive patients where came *p. aeruginosa* ranked first, followed by Staphylococcus aureus ranked second .**Conclusion:** *s. aureus* bacteria are the most caused wound inflammation injuries in caesarean section in women with both diseases (hyperthyroidism, anemia, diabetes) except hypertension, where *p. aeruginosa* bacteria were the most associated injuries in women with this disease in caesarean section.

Keywords: caesarean sections, anemia, diabetes, hyperthyroidism, hypertension, women

1.Literature Review

Wound infections are a common cause of hospital admission and are covered by the media. We became motivated to look at the origins of infections as well as the reasons why wound patients end up in hospitals and die because of how crucial it is for health care to contain costs. The available data that we are able to locate demonstrates how the government has stepped up its monitoring of hospital admissions that are required to be reported due to *wound infections by home health and hospice providers. [1, 2, 3]*

1.1. What Makes a Contaminated Wound Different from a Colonized One

One can define an infection in a variety of ways, and bioburden in a wound does not always mean that the wound bed is infected, according to Sharon Baranoski's "Wound Care Essentials". The typical flora on the skin's surface, known as bioburden, plays a crucial role in controlling bacteria. An infection results from the removal or reduction of the natural flora, which causes a rise in pollution from a wide variety of microorganisms. The definition of contamination in a wound is the existence of bacteria without their growth. An infection does not always result from the bacteria entering the wound bed from the surrounding tissue until their population grows. The term "colonization of the wound" refers to the growth in bacterial population. [1,2]

Carbapenem-resistant Enterobacteriaceae (CRE), a bacterium linked to Klebsiella species and Escherichia coli (E. coli), is one of the microorganisms that are currently a source of worry. This particular bacterium is found in the digestive system and was only recently discovered. "The emergence and dissemination of Carbapenem-resistance among Enterobacteriaceae in the United States represent a serious threat to public health," according to the Centers for Disease Control (CDC). This illness poses a threat due to its high fatality rate and quick transmission. The CDC also stated that KPC (Klebsiella pneumonia carbapenem-ase) was discovered in 2001 and that CRE first appeared and was identified in 1992. The majority of cases of these bacteria are discovered in healthcare environments, despite its presence not being nationwide. The CDC provided more details.[3]

1.2. Risk of Intestinal Bacterial Infection after Cesarean Delivery

Over the past few decades, there has been a significant increase in the use of cesarean births, or C-sections, which now account for up to 30% of all deliveries in some countries. An altered bacterial colonization of the newborn's bowel following a cesarean delivery has been linked to prolonged immunological immaturity and increased vulnerability to a variety of disorders. Increasing the number of C-sections performed may have an effect on a patient's susceptibility to intestinal bacterial infections because colonization patterns are crucial for the development and homeostasis of innate and adaptive immunity to pathogens, mucosa-associated barrier defense in opposition to pathogens, and openness induction. [4,5]

The days following birth and the weaning process are two crucial times for gut colonization. The fetal gut is sterile during intrauterine development, but the colonization process starts when the baby is exposed to the mother's birth canal bacterial flora during vaginal delivery. Many Escherichia coli and streptococci enter the digestive tract within days, and nursing causes a succession of anaerobes (Bifidobacterium, Bacteroides, and Clostridium species) that may be linked to bifidobacterial growth factors in breast milk. Newborns fed formula exhibit elevated levels of Bifidobacterium, Bacteroides, Clostridium species, and Enterobacteriaceae and enterococci. On the other hand, infants delivered via cesarean section do not come into contact with vaginal or fecal infections. Additionally, they frequently endure extended hospital stays, increased mother-infant separation [6]

All things considered, the defense against intestinal infections may be compromised by altered intestinal microbiota after cesarean delivery; nevertheless, epidemiological attention to these concerns has been lacking. Thus, we evaluated the risk of intestinal bacterial infections according to mode of delivery in a large cohort of Danish women and infants by utilizing the national registries. [4,6]

1.3. Hyperthyroidism in pregnant

Your thyroid produces two important hormones that have an impact on bodily functions. Triiodothyronine (T-3) and thyroxine (T-4) are the names for them.
Your thyroid regulates various bodily functions, including heart rate and caloric expenditure. Hormones are released to regulate your metabolism, which is the process by which your body converts food into energy and sustains you. [7,8,9]

1.4. Anemia in pregnant

Abnormal bleeding might be the cause of anemia. Bleeding can happen suddenly, either after an injury or during surgery. Chronic bleeding is characterized by slow, recurrent bleeding that is usually brought on by irregularities in the urinary or digestive tract or by high menstrual flow. Low iron levels are usually the result of chronic bleeding, which exacerbates anemia [10]

Insufficient production of red blood cells by the organism can also lead to anemia. The synthesis of red blood cells requires a variety of substances. Iron, vitamin B12, and folate, or folic acid, are the most important, but the body also need tiny levels of copper and a healthy hormonal balance, particularly for erythropoietin, a hormone that promotes the generation of red blood cells. Red blood cell formation is sluggish and insufficient without certain nutrients and hormones, or the red blood cells may be distorted and unable to deliver oxygen in sufficient amounts. [11]

1.5. Diabetes in pregnant

The term "gestational diabetes mellitus" (GDM) refers to a varied degree of glucose intolerance that first manifests or begins during pregnancy. Separate from other clinical risk factors, this condition was linked to chronic metabolic dysfunction in women three years after birth, Preexisting diabetes mellitus increases a mother's risk of significant birth injuries by double, her chance of a cesarean delivery increases by three times, and her chance of being admitted to the newborn intensive care unit (NICU) increases by four times. [12,13, 14]

1.6. Hypertension in pregnant

Pregnancy-related hypertension disorders carry a significant risk of morbidity for both the mother and the fetus. These disorders include chronic hypertension with or without superimposed pre-eclampsia/eclampsia, gestational hypertension, preeclampsia with or without severe features, hemolysis, elevated liver enzymes and low platelet count (HELLP) syndrome, or eclampsia. Although morbidity and death have decreased as a result of effective prenatal care, close observation to identify indicators of end organ damage, and quick delivery to minimize or eliminate negative effects, these events still happen. Pregnancy-related hypertension raises problems in and of itself, but the main issues are related to the progression of the condition to pre-eclampsia/eclampsia and the HELLP syndrome. This exercise examines the assessment and treatment of hypertension in pregnancy and emphasizes the value of an interdisciplinary team in assessing and enhancing patient care. [15,16,17]

Aim of this study: to know what types of bacteria were infected caesarean wounds and what types of related diseases related with them.

2.Methodology

2.1. Samples collection

Samples of caesarean section wounds were collected from 1/2/2023 to 10/6/2023 at Imam Sadiq Hospitals and Al-Hillah Teaching Hospital in Babylon Governorate in Iraq. The bacteria were diagnosed through several biochemical tests for diagnosis and identification. Microscopical, biochemical tests, and pigmentation were carried out according to [18].

2.2. Statistical analysis

Statistical tests were conducted to extract percentages through Microsoft Office: Excel 2019.

3. Results   and Discussion

3.1. Diagnosis of bacteria

Microscopical and biochemical diagnosis

Table 1: Microscopical and biochemical diagnosis

No.	Type of bacteria	Gram staining	Catalase	MR	Indole	Citrate	Urease	Nitrate reduction
1	*p. aeruginosa*	-ve	+ve	-ve	-ve	+ve	-ve	-ve
2	*E. Coli*	-ve	+ve	+ve	+ve	-ve	-ve	+ve
3	*S. aureus*	+ve	+ve	+ve	-ve	+ve	+ve	+ve
4	*P. vulgaris*	-ve	+ve	+ve	-ve	+ve	+ve	+ve

3.2. Bacteria with diseases

By conducting field surveys of wound-accompanying bacteria in caesarean section, the following results were achieved according to the tables below

Table 2: types of bacteria associated with hyperthyroidism

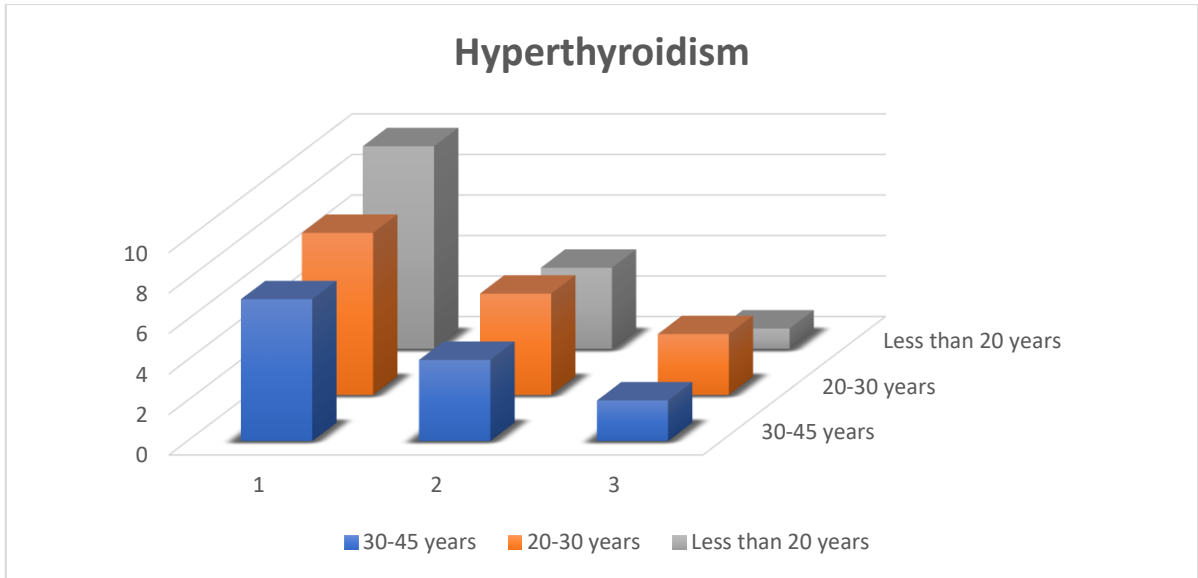| No.	Hyperthyroidism		
Less than 20 years		20-30 years	30-45 years
1	*S. aureus (8%)*	*) S. aureus (16%*	*S. aureus (15%)*
2	*E. coli (1%)*	*E. coli (9%)*	*E. coli (11%)*
3	-	*P. aeruginosa (4%)*	*P. aeruginosa (8%)*
Sum	9%	29%	34%

Figure 1: types of bacteria associated with hyperthyroidism divided according to age range

The most infections were in the 30-45 age group by 34%. This may be due to an increase in thyroid secretions in the immune system and their weakness with age, while the lowest incidence was in the under 20 age group indicating a weak effect of increased thyroid secretions on the immune system in this age group.

Table 3: types of bacteria associated with anemia

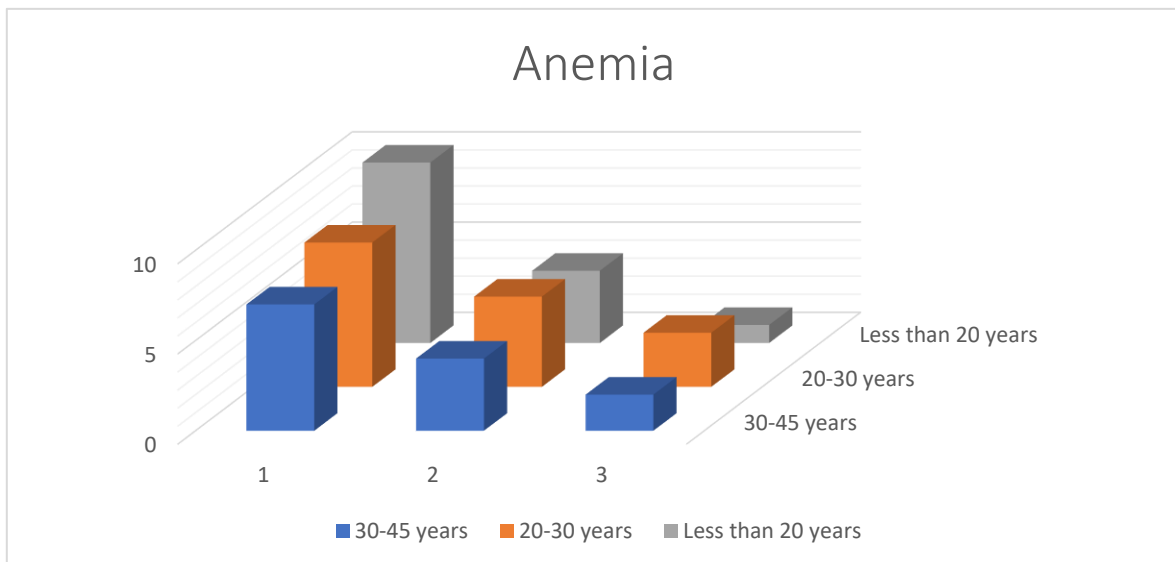| No.	Anemia		
Less than 20 years		20-30 years	30-45 years
1	*S. aureus (13%)*	*S. aureus (15%)*	*S. aureus (17%)*
2	*P. vulgaris (3%)*	*P. aeruginosa (10%)*	*P. aeruginosa (11%)*
3	*P. aeruginosa (1%)*	*E. coli (7%)*	*E. coli (7%)*
Sum	17%	32%	*35%*

Figure 2: types of bacteria associated with anemia divided according to age range

The table above shows us that bacterial injuries in women with anemia increase in the age group 30-45 and the severity and severity of the injury may affect the functioning of the immune system. This age group also has a higher rate of pregnancy and births than other groups.

Table 4: types of bacteria associated with diabetes

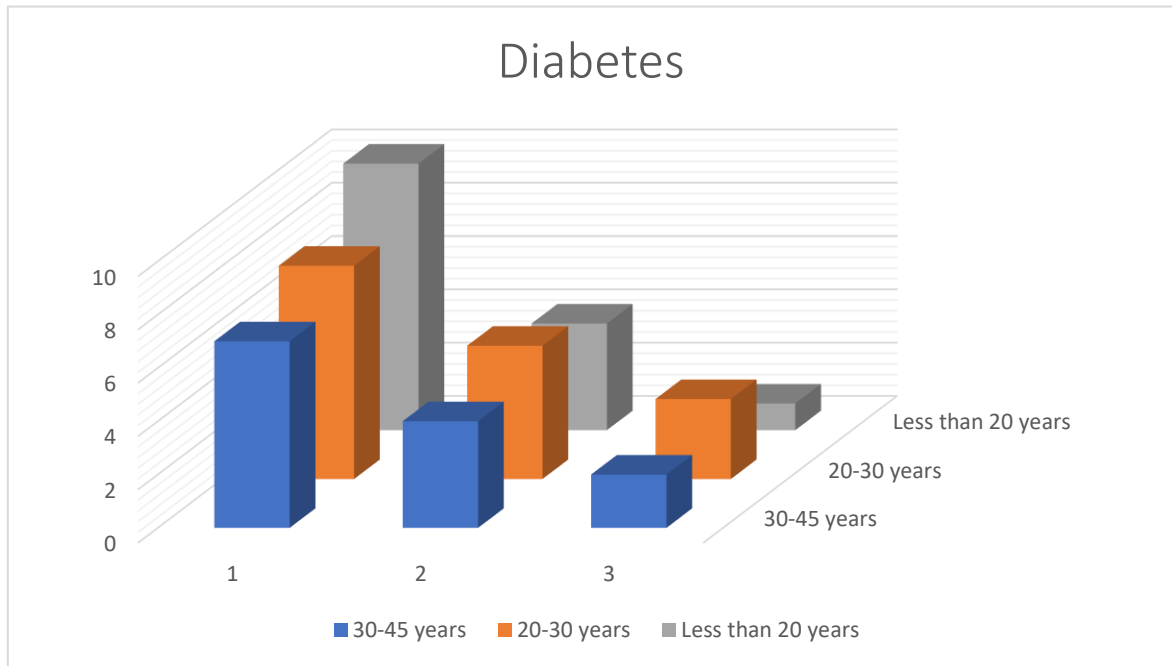| No.	Diabetes		
Less than 20 years		20-30 years	30-45 years
1	*P. aeruginosa (13%)*	*S. aureus (19%)*	*S. aureus (20%)*
2	*E. coli (8%)*	*Proteus vulgaris (12%)*	*Proteus vulgaris (15%)*
3	*S. aureus (5%)*	*E. coli (9%)*	*E. coli (12%)*
Sum	26%	*40%*	*47%*

Figure 3: types of bacteria associated with diabetes divided according to age range

The above table shows the appearance of proteus bacteria, which is an indicator of the presence of kidney stones in women with these bacteria, indicating that there is a relationship and correlation somehow between diabetes and kidney stones with age in women.

Table 5: types of bacteria associated with hypertension

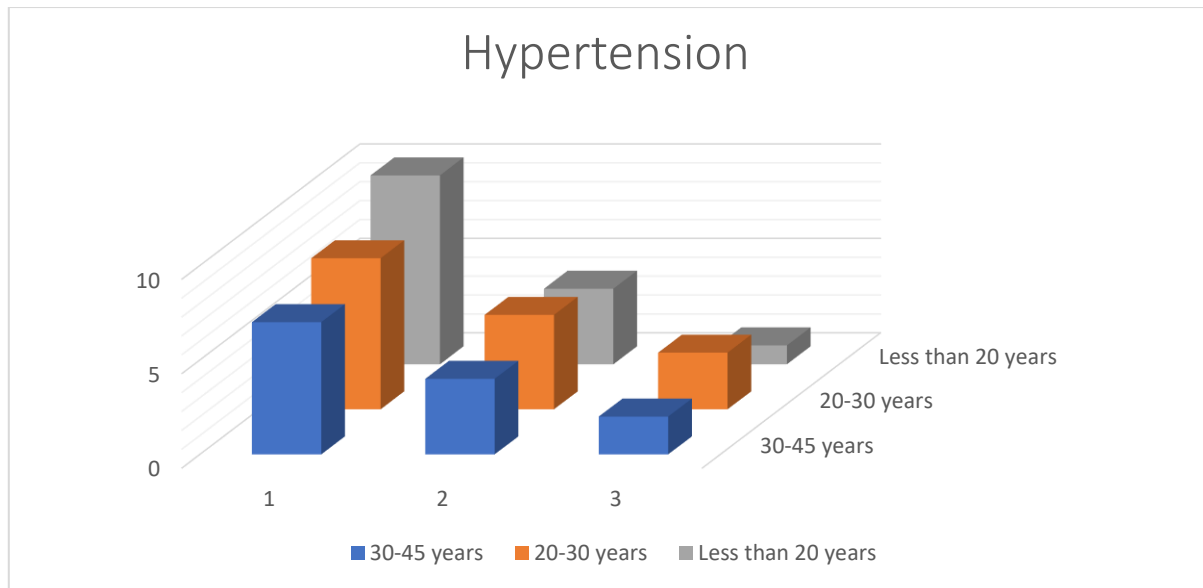| No.	Hypertension		
Less than 20 years		20-30 years	30-45 years
1	*P. aeruginosa (10%)*	*P. aeruginosa (8%)*	*P. aeruginosa (7%)*
2	*S. aureus (4%%)*	*S. aureus (5%)*	*E. coli (4%)*
3	*E. coli (1%)*	*E. coli (3%)*	*S. aureus (2%)*
Sum	15%	*16%*	13%

Figure 4: types of bacteria associated with diabetes divided according to age range

We note the increasing appearance of *p. aeruginosa* bacteria in different age groups and the main cause may be hospital infections as these bacteria are considered to be the primary bacteria causing hospital infections, they are also considered to be resistant to antibiotics and the presence of these bacteria in high blood pressure sufferers may indicate an association between blood pressure and the weakness of the immune system responsible for resistance to these bacteria.

Conclusion

s. aureus bacteria are the most caused wound inflammation injuries in caesarean section in women with both diseases (hyperthyroidism, anemia, diabetes) except hypertension, where *p. aeruginosa* bacteria were the most associated injuries in women with this disease in caesarean section.

Recommendation

Extending subsequent studies to include other diseases, and studying the overlap between diseases and its impact on the type of bacteria causing wound injuries in caesarean section

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