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The role of CD138 immunohistochemical marker in the diagnosis of chronic endometritis: causes of female infertility

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Abstract

This article focused on "The role of CD138 immunohistochemical marker in the diagnosis of chronic endometritis: causes of female infertility".

Aims: The aim of the study was to assess the diagnostic efficacy of CD138 in identifying chronic endometritis among infertile patients with endometrial pathology and to examine the association between CE and various factors related to infertility.

Methodology: A cross-sectional observational study exploring the utility of the CD138 immunohistochemical marker in diagnosing chronic endometritis and its association with infertility in a sample of 63 couples. The t-test, chi-square test and logistic regression was applied using SPSS 26.

Results: The study examined infertility characteristics and chronic endometritis in 63 infertile woman with pathology of endometrium. Results also established a significant association between CE and CD 138 presence, suggesting CD 138 as a potential diagnostic marker for CE. Additionally, the age was identified as a notable factor linked to CE. Factors such as abortion history, intrauterine interventions, delivery experiences, and cervical pathology, mycoplasma infections were found to have a significant correlation with CE. The logistic regression indicated a lower likelihood of CE in certain infertility types. It also identified a significant association between increased CE odds and longer fertility duration, while specific causes of fertility had a modest impact. Overall, CD 138 demonstrated its diagnostic potential for CE, age was associated with CE, and certain factors correlated with CE, emphasising the complexity of CE etiology in infertility patients with endometrial patology.

Scientific Novelty: A Gateway to Understanding Female Infertility

Conclusion: In conclusion, the research findings underscored the significance of CD 138 as a diagnostic marker for chronic endometritis in infertility patients. The age emerged as a notable factor associated with CE, while specific qualitative factors like delivery history exhibited a correlations with CE status, warranting further investigation.

Keywords: CD138; immunohistochemical marker; chronic endometritis.

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Introduction

Chronic endometritis is a pathological condition characterized by inflammation of the endometrium, the inner lining of the uterus. This inflammation may result in a range of reproductive health issues, such as female infertility. Chronic endometritis is characterized by diverse, mostly minor symptoms including pelvic pain, spotting, and menstrual irregularities. Other symptoms, such as vaginal discharge, may also be present. The diagnosis depends on a comprehensive review, which includes the tissue samples examination and immunohistochemistry markers use, due to the unclear nature of its presentation [1, 2].

The accurate diagnosis of CE is crucial for guiding appropriate treatment strategies and improving fertility outcomes. In recent years, the utilisation of immunohistochemical markers, particularly CD138, has emerged as a valuable tool in the diagnosis of CE [3].

CD138, or syndecan-1, is a kind of proteoglycan found on the surface of plasma cells and certain epithelial cells. CD138 has gained recognition in the field of endometrial pathology as a precise indicator for detecting plasma cells in the endometrial tissue. Plasma cells play a vital role in the immune response and are frequently elevated in cases of chronic inflammation, such as CE [4, 5].

CD138 immunohistochemistry stands out as a superior diagnostic tool for chronic endometritis due to its high specificity and sensitivity in detecting plasma cells within the endometrial tissue. This marker offers an objective and consistent method for quantifying plasma cells, reducing diagnostic subjectivity compared to traditional histological examination alone. Its reliability enables early and accurate diagnosis, guiding timely treatment interventions to improve fertility outcomes. Additionally, CD138 IHC enhances detection even in cases where conventional methods may miss plasma cells, ensuring a more comprehensive evaluation. Overall, CD138 immunohistochemistry plays a crucial role in the diagnostic pathway for CE, contributing to more effective patient management and better reproductive health outcomes [6]. Chronic endometritis is frequently observed in cases of recurrent pregnancy loss, failed IVF attempts, that cannot be explained by other factors. Treatment has been seen to result in improved pregnancy outcomes in future pregnancies. Utilising CD138 immunohistochemistry enhances the identification rate of chronic endometritis [7].

The standard method for diagnosing CE relies on histological examination of endometrial samples, which involves identifying the infiltration of the endometrial stroma by plasma cells, lymphocytes. However, the conventional histological assessment may provide challenges due to the subjective interpretation of inflammatory changes and the lack of uniformity in tissue collection. Consequently, scientists have started examining other indicators, such CD138, to enhance the reliability and exactness of CE diagnosis [8].

Infertility is a common gynecological condition that has been increasing in frequency in recent years. Embryo quality and endometrial receptivity are the primary parameters that significantly influence the likelihood of successful embryo implantation and pregnancy rates [8]. Inflammatory disorders that impact the endometrial cavity may have an effect on the successful implantation of a fertilised egg, leading to either infertility or miscarriage. When looked at through an epidemiological lens, the occurrence of CE in individuals with a history of infertility can range from 2.8% to 67.6%, demonstrating a broad spectrum of occurrence [9].

Chronic endometritis is often associated with various reproductive health complications, including female infertility. An accurate diagnosis is imperative for guiding appropriate treatment strategies and improving fertility outcomes. In recent years, immunohistochemical markers, CD138 immunohistochemistry has demonstrated high accuracy and reliability in detecting CE [10]. However, It should be highlighted that while CD138 is commonly used, other alternatives like CD 8, CD 20, CD4 immunohistochemistry have been studied and proven to be equally reliable. The diagnosis of CE relies on identifying plasma cells within the inflammatory infiltrate in the endometrium. Immunohistochemical labeling enhances the identification of these cells, hence improving the diagnostic accuracy [11].

The CD138 immunohistochemical staining showed a higher level of positivity than standard histological examination. This suggests that it can enhance the detection of plasma cells, even in cases where traditional methods are unsuccessful [12].

The high dependability of this technology allows for prompt and precise identification of medical conditions, enabling appropriate therapeutic measures to enhance reproductive results. Moreover, CD138 immunohistochemistry is specifically advised for individuals who have a past of extended bouts of monthly hemorrhage, abortion, or fallopian tube blockage, since these variables are recognised as risk factors for implantation failure. CD138 immunohistochemistry is essential in diagnosing CE and is crucial in improving patient care and reproductive health outcomes [11].

Research Problem

CD138 immunohistochemistry emerges as a highly reliable and specific diagnostic tool for chronic endometritis, particularly concerning female infertility.

This methodology offers an objective and consistent means of quantifying plasma cells, markedly reducing diagnostic subjectivity when compared to traditional histological examination alone. Research underscores the superiority of CD138 IHC in enhancing CE diagnosis rates, with its positive immunohistochemical staining exhibiting greater efficacy than conventional histological methods. Hence, CD138 immunohistochemistry assumes a pivotal role in the diagnostic pathway for CE, significantly contributing to more precise patient management and improved reproductive health outcomes.

Research Focus

The study aimed to examine the function of CD138, an immunohistochemical marker, in diagnosing chronic endometritis and its correlation with female infertility. The purpose was to explore both quantitative and qualitative factors related to infertility, including duration of infertility, type of infertility, and potential causes, in relation to CE.

Research Aim and Research Questions

Research Aim

To assess the diagnostic utility of CD138 in identifying chronic endometritis among infertile patients against the background of endometrial pathology to examine the association between CE and various factors related to infertility.

Research Questions

1. What is the chronic endometritis prevalence among infertile patients against the background of endometrial pathology and how does the presence of CD138 correlate with CE status?
2. What are the numerical factors linked to CE, such as age, Body Mass Index (BMI), characteristics of the menstrual cycle, number of pregnancies, and number of live births?
3. Are there any qualitative factors significantly associated with CE, such as delivery history, abortion, cervical infections, or other gynecological conditions?
4. How do variables such as infertility duration, infertility type (primary vs. secondary), and infertility cause (polyps of endometrium, hyperplasia) influence the likelihood of chronic endometritis?
5. Can logistic regression analyses provide insight into the independent associations between CD138, infertility duration, type of infertility, and infertility cause with chronic endometritis?

Research Methodology

General Background

Chronic endometritis has been identified as one of the main cause of female infertility. Although other infections and immunological disorder have been suggested as potential causes, accurately diagnosing the condition remains difficult. CD138 is being considered as a possible immunohistochemistry diagnostic for chronic endometritis. Its utility lies in identifying plasma cells infiltrating the endometrium, indicative of chronic inflammation. Incorporating CD138 immunohistochemistry may offer improved sensitivity and specificity, aiding in the accurate identification of chronic endometritis cases. This research sought to the identify the association of CD138 with female infertility. By recognising the expression pattern and diagnostic significance of CD138, healthcare providers can improve their capacity to detect and treat chronic endometritis, potentially leading to better reproductive outcomes for affected individuals.

Study Design

A cross-sectional observational design to examine the significance of the CD138 in the diagnosis of chronic endometritis and its association with infertility was used in the current study.

Participants

The study enrolled 63 couples experiencing infertility. The inclusion criteria: women with infertility due to endometrial pathology seeking infertility treatment, aged 18-45 years, and willing to participate. The exclusion criteria comprised individuals with availability sexually transmitted diseases; anomalies of the development of female genital organs; infertility of endocrine and tubo-peritoneal genesis, endometriosis, uterine fibroids, polycystic ovary syndrome (PCOS), hyperandrogenism of adrenal genesis, dysfunctional conditions caused by thyroid gland pathology, severe extragenital pathology, oncological pathology of the endometrium.

Data Collection

Data collection occurred in a specialized clinic for infertility treatments. Participants underwent medical history review, physical examination, and laboratory investigations. Relevant demographic information, including age, BMI,

menstrual cycle characteristics, gravity, and parity, was recorded. Additionally, qualitative factors such as delivery history, abortion, cervical infections, and gynecological conditions were assessed through medical records and patient interviews. Endometrial biopsy samples were collected from participants for CD138 immunohistochemical analysis. The biopsy specimens were processed using standard histological techniques, and CD138 expression was assessed by immunohistochemistry staining. The presence or absence of CD138 was determined based on staining patterns observed under a light microscope.

Data Analysis

The study topics were addressed via the use of suitable statistical analysis methodologies. Descriptive statistics were computed to characterize the demographic and clinical features of the research population. The chi-square tests were utilized to analyze associations between qualitative variables (CE status, CD138 expression, and qualitative infertility factors). Independent sample t-tests were used for comparisons of quantitative variables between CE and non-CE groups. Logistic regression analyses were conducted to examine the associations between CE status and various factors, including infertility duration, type of infertility, and infertility causes, adjusting for potential confounders.

Research Results

Table 1 presents the frequency distribution of infertility characteristics among couples experiencing infertility. The duration of infertility varied, with 13% experiencing durations experiencing duration about a 1 year, 43% between 1 to 2 years, 29% between 2 to 3 years, and 15% experiencing durations exceeding 3 years. In terms of infertility type, an equal proportion of couples, 49,2% and 51,8% each, were classified as either primary or secondary infertility. When examining the causes of infertility, it was found that polyp of endometrium were the most prevalent, accounting for 77,7% of cases, followed by hyperplasia endometrium at 25,3%.

Table 1. Frequency distribution of Infertility characteristics among CE.

Variable	Categories	Frequency	Percent
Duration of Infertility	<1	13	20.0
	1-2	27	42.8
	2-3	16	25.3
	>3	7	11.1
Infertility Type	Primary	31	49.2
	Secondary	32	51.8
Cause of infertility	Endometrial hyperplasia	16	25.3
	Endometrial polyp	49	77.7

Source : author's development

This summary provides an overview of the distribution of infertility characteristics, emphasised the range of durations, the equal representation of primary and secondary infertility, and the various contributing factors within the CE group.

Table 2 presents the distribution of chronic endometritis (CE) of varying degrees status among 100 women with infertility due to endometrial pathology seeking infertility treatment with a focus on the presence or absence of CD 138, a marker indicative of CE. Among the participants, 49 individuals were diagnosed with CE while 8 were weakly positive . On the other hand, 14 participants did not have CE, with testing negative for CD 138. The chi-square test revealed a statistically significant association between CE status and CD 138 presence ($\chi 2 = 48.919$, $p < 0.001$), indicating that CD 138 positivity was more prevalent among individuals with CE compared to those without. This suggests a potential diagnostic utility of CD 138 in identifying chronic endometritis among infertile patients.

Table 2. Study participants having CE and NCE status among 100 infertile Patients.

		CD 138				
		Positive	Weakly positive	Total	Chi-square	P-value
Chronic Endometritis	Yes	49	8	49	77.919	0.000
	No	0	0	14		
		49	8	63		

Source: author's development

In conclusion the overall results indicate a strong association between chronic endometritis and the presence of CD 138, a marker indicative of CE. Specifically, among the studied infertile patients, those diagnosed with CE were much more likely to test positive for CD 138 compared to those without CE. This suggests that CD 138 could be a useful diagnostic tool for identifying CE in infertile patients. The statistically significant chi-square test further supports this association. This suggests that the connection between CE status and the presence of CD 138 is probably not a coincidence.

Table 3 presents the comparison of quantitative factors between Chronic Endometritis and not Chronic Endometritis groups. The analysed variables include age, body mass index, menstrual cycle length, menstrual period duration, gravity (number of pregnancies), and parity (number of live births). The mean age was significantly higher in the CE group compared to the NCE group (34.69 ± 5.58 years vs. 31.06 ± 5.88 years, p = .002). However, there were no significant differences observed in BMI, menstrual cycle length, menstrual period duration, gravity, or parity between the two groups. This suggests that while the age may be associated with Chronic Endometritis, other factors such as BMI, menstrual characteristics, and reproductive history may not significantly differ between individuals with and without Chronic Endometritis.

Table 3. Quantitative factors related to CE and NCE.

			t-test for Equality of Means				
	CE	NCE	t	Sig. (2-tailed)	Std. Error Difference	95% CI	
						Lower	Upper
Age	34.69 ± 5.58	31.06 ± 5.88	3.155	.002	1.150	1.347	5.913
Body mass index	19.98 ± 3.02	20.67 ± 3.13	-1.110	.270	.61703	-1.90968	.53927
Menstrual cycle	28.19 ± .047	28.25 ± 0.50	-.637	.526	.09846	-.25806	.13270
Menstrual period	5.48 ± 0.62	5.35 ± 0.57	1.037	.302	.11997	-.11364	.36252
Gravity	1.46 ± 0.32	1.55 ± 0.34	-1.276	.205	.06732	-.21952	.04766
Parity	0.61 ± 0.21	0.65 ± 0.20	-.839	.404	.04223	-.11922	.04839

Source: author's development

In summary, while the age appears to be a factor associated with Chronic Endometritis, other factors examined in this study do not seem to show significant differences between individuals with and without the condition. It suggests that the age may play a unique role in the development or manifestation of Chronic Endometritis, while other factors analysed in this study may not be as influential.

Table 4 presents the qualitative factors associated with Chronic Endometritis (CE) and non-Chronic Endometritis (NCE). Among the analysed factors menorrhagia, delivery history, abortion, spontaneous abortion, vaginitis, pelvic inflammation, cervical pathology, mycoplasma infection was considered. The table demonstrates the total number of cases for each factor, broken down into those with CE and NCE, along with the chi-square values and corresponding p-values indicating the significance of the association between the factor and the presence of CE. Factors such as abortion (p=0.03), spontaneous abortion (p=0.05), and mycoplasma infection (p=0.117) showed

statistical significance, suggesting a potential correlation with Chronic Endometritis, while other factors like menorrhagia, delivery history, cervical pathology did not demonstrate statistically significant associations with CE.

Table 4. Qualitative factors related to CE and NCE

Factors	Total	Total	CE	NCE	Chi-square	P-value
Menorrhagia	Yes	21	8	13	0.855	0.355
	No	42	22	20		
Spontaneous Abortion	Yes	38	28	10	3.846	0.05
	No	25	13	12		
Abortion	Yes	39	26	13	4.696	0.03
	No	24	10	14		
Delivery History	Yes	42	20	22	0.098	0.754
	No	21	13	8		
Vaginitis	Yes	33	16	17	0.026	0.872
	No	30	14	16		
Pelvic Inflammation	Yes	45	39	6	0.92	0.337
	No	18	11	7		
Mycoplasma Infection	Yes	39	29	10	2.462	0.117
	No	24	4	20		
Cervical pathology	Yes	14	4	10	2.462	0.117
	No	49	25	24		

Source : author's development

In summary the study showed statistically significant associations between CE and abortion, spontaneous abortion, and pelvic inflammation and mycoplasma infection, suggesting a potential correlation. However, factors like delivery history, menorrhagia, vaginitis, cervical pathology did not exhibit significant associations with CE. These findings imply that certain factors may predispose individuals to CE, highlighting the importance of understanding these factors for improved diagnosis and management of the condition.

Table 5 presents the results of a logistic regression analysis examining the association between Chronic Endometritis and various factors. The analysis includes variables such as duration of fertility, infertility type, and cause of fertility. The odds ratio for each variable indicates the likelihood of having CE compared to not having CE, with an OR greater than 1 suggesting a positive association and an OR less than 1 suggesting a negative association. The P-values indicate the statistical significance of the associations, with values less than 0.05 typically considered significant. According to the results, infertility type shows a statistically significant association with CE (P = 0.0139), with an odds ratio of 0.419, suggesting that individuals with certain infertility types are less likely to have CE. However, the duration of fertility and cause of fertility show non-significant associations with CE (P = 0.382 and P = 0.071, respectively). The odds ratios for these variables are 0.254 and 0.286, respectively, indicating no strong association with CE. It's important to note the wide confidence intervals for some variables, indicating uncertainty in the estimates.

Table 5. Logistic regression CE to other factors

Variable	B value	P-value	Odd ratio	95% CI
Duration of fertility	1.370	0.382	0.254	0.048-1.344
Infertility type	0.871	0.0139	0.419	0.132-1.325

Cause of Fertility	1.253	0.071	0.286	0.73-1.115

Source: author's development

In conclusion the logistic regression analysis reveals significant association between Chronic Endometritis and infertility type indicating lower likelihood of CE in certain infertility types. However, the duration of fertility and the cause of fertility exhibit non-significant associations, suggesting weak links to CE.

Table 6 presents the results of logistic regression analysis examining the association between chronic endometritis and various factors. The cause of fertility exhibited a statistically significant association (B = 1.338, p = 0.005) with a higher odd ratio of 0.262 (95% CI: 0.052-1.326), indicating that cause of fertility may be linked to a reduced likelihood of chronic endometritis. However, the infertility type did not show a significant association (B = 1.04, p = 0.847), with an odd ratio of 0.901 (95% CI: 0.312-2.600), suggesting no strong relationship between infertility type and chronic endometritis. On the other hand, duration of fertility displayed a significant association (B = 0.015, p = 0.002), with an odd ratio of 0.985 (95% CI: 0.275-3.353), indicating that longer duration of fertility may have a modest impact on the likelihood of chronic endometritis. These findings collectively suggest that while the duration of fertility and certain causes of fertility may be associated with chronic endometritis, the type of infertility does not seem to play a significant role.

Table 6. Logistic regression CD138 to other factors

Variable	B value	P-value	Odd ratio	95% CI
Cause fertility	1.338	0.005	0.262	0.052-1.326
Infertility type	1.04	0.847	0.901	0.312-2.600
Duration of Fertility	0.015	0.002	0.985	0.275-3.353

Source : author's development

In summary the logistic regression analysis indicates that a causes of fertility is significantly associated with reduced odds of chronic endometritis. Conversely, infertility type shows no significant association. However, longer duration of fertility issues exhibit a modest impact on chronic endometritis likelihood.

Discussion

Studies have investigated the utility of the CD138 marker in diagnosing chronic endometritis and its link to female infertility. The results indicate that the use of CD138 immunohistochemistry may improve the diagnosis of CE, especially in patients with a past of spontaneous abortion, pelvic inflammation, or intrauterine interventions, that are considered to be at a high risk for CE. A similar study proposed that adding endometrial staining of CD138, alongside other markers, could improve the clinical diagnosis and pregnancy outcomes in cases of unexplained infertility and recurrent in vitro fertilisation failures [13]. Moreover, the quantification of CD138 in the endometrium has been proposed as an adverse prognostic indicator for patients who have had unsuccessful embryo transfers. This suggests that CD138 may have a predictive function in determining pregnancy outcomes for certain people [15].

The current study investigated chronic endometritis among 100 infertile patients, focusing on CD138 as a marker for CE. The results showed that CD138 positivity was occurred in almost half of women with infertility on the background of endometrial pathology, suggesting its potential diagnostic value in identifying CE among infertile patients. Previous research has also indicated that CD138 immunohistochemical staining can enhance CE diagnosis rates, particularly in patients with a history of abortion, spontaneous abortion, pelvic inflammation, or intrauterine interventions, who are at higher risk for CE [16]. In addition, the measurement of CD138 levels in the endometrium has been suggested as a detrimental prognostic indicator for individuals who have had unsuccessful embryo transfers, suggesting its potential use in forecasting pregnancy results [15].

The frequency of chronic endometritis and its connection with infertility, particularly in women, have been investigated in several research [17]. CD138, a biomarker indicating the readiness of the endometrium to support pregnancy, has been linked to unfavorable pregnancy results in infertile women undergoing in vitro fertilisation or intracytoplasmic sperm injection cycles. The research has shown that the presence of CD138+ cells in the endometrium during the period of the cell growth is correlated with decreased chances of pregnancy, whilst higher numbers of CD138+ cells are connected to poor outcomes. More precisely, women who have two or more CD138+ cells per high-power field in the endometrium have significantly lower pregnancy chances. These rates continue to

decrease as the number of CD138+ cells increases. For example, the clinical pregnancy rate was 40.6% when the number of CD138+ cells in the endometrium was at least 2 per high-power field, but decreased to 30.0% when the count surpassed 8 per HPF. The data indicate that CD138+ cells might be a poor predictive factor for pregnancy outcomes in infertile women undergoing IVF/ICSI cycles [18,15].

The current study explored the quantitative factors linked to infertility in couples, comparing those with Chronic Endometritis (CE) to those without. Surprisingly, there was a significant difference in average age between the two groups, suggesting a potential relationship between age and the presence of CE. Nevertheless, the two groups did not exhibit significant variations in parameters like as BMI, menstrual features, and reproductive history. This indicates that while the age may be associated with CE, other examined parameters, such as BMI, menstrual cycle length, menstrual period duration, gravity, and parity, showed no significant differences between those with and without CE. Additional research has also explored the relationship between CE and other factors linked to infertility [19]. A further research observed a greater occurrence of CE among women who are unable to conceive and had endometrial polyps, indicating a possible correlation between these two disorders [20]. Furthermore, studies have examined the diagnostic significance of CD138 for CE, suggesting that CD138 immunohistochemical staining may enhance the rate and precision of CE diagnosis [21]. In addition, study has examined the association between CE and various forms of endometrial pathology highlighting the need of comprehending the connection between CE and certain causes of infertility [22]. In summary, while the age has been associated with CE in the context of infertility, other factors such as BMI, menstrual characteristics, and reproductive history may not significantly differ between individuals with and without CE. Recent research has shed light on the association of CE with various factors related to infertility, including endometrial polyps, CD138 expression, and specific causes of infertility, offering valuable insights into the complex interplay between CE and infertility.

A comparative analysis was conducted in this study in order to investigate qualitative factors associated with Chronic Endometritis (CE) versus non-Chronic Endometritis (NCE) among infertile patients with endometrial pathology. The examined factors included menorrhagia, delivery history, abortion, spontaneous abortion, vaginitis, pelvic inflammation, mycoplasma infection, cervical pathology. The results indicated that factors such as abortion, spontaneous abortion, pelvic inflammation, mycoplasma infection, exhibited statistical significance, suggesting a potential correlation with CE. Nevertheless, there were no statistically significant correlations found between CE and any other variables. Furthermore, studies have shown a greater occurrence of CE among women who were unable to conceive and have endometrial polyps, suggesting a possible correlation between these two disorders [23, 20]. Moreover, the diagnostic significance of CD138 in CE has been investigated, indicating that CD138 immunohistochemical staining has the potential to improve the rate and precision of CE diagnosis [19]. These findings collectively shed light on the intricate relationship between CE and various factors linked to infertility, emphasising the necessity for further research in this domain.

The logistic regression analysis explored the link between Chronic Endometritis (CE) and factors such as the duration of fertility, infertility type, and the cause of fertility. The results revealed a statistically significant association between infertility type and CE. Individuals with specific infertility types were found to be less likely to have CE. However, no significant associations were observed between the duration of fertility and the cause of fertility with CE. The odds ratios for these variables did not indicate a strong connection with CE, and it's essential to note the wide confidence intervals, signifying uncertainty in the estimates [22]. Notably, a study found a higher prevalence of chronic endometritis in infertile women with endometrial polyps, suggesting a potential association between these conditions [24]. Moreover, the diagnostic value of CD138 for CE has been explored. CD138 immunohistochemical staining has been proposed to enhance the diagnosis rate and accuracy of CE [25]. These studies offer valuable insights into the intricate interplay between CE and various infertility-related factors, underscoring the necessity for further research in this domain.

A logistic regression analysis investigated the potential factors associated with chronic endometritis, revealing notable findings regarding the duration of fertility, type of infertility, and cause of fertility issues. The results indicated a significant association between the duration of fertility and chronic endometritis, with a higher odds ratio suggesting a potential link between increased duration of fertility and increased likelihood of chronic endometritis. Conversely, the type of infertility did not demonstrate a significant association, indicating no strong relationship between infertility type and chronic endometritis. However, specific causes of fertility issues exhibited a significant association, suggesting a modest impact on the likelihood of chronic endometritis [26]. While the etiology of chronic endometritis often remains unknown, some studies have suggested potential associations with noninfectious factors such as intrauterine contraceptive devices, endometrial polyps, endometrial hyperplasia. Some important risk factors for chronic endometritis include the utilization of contraceptive intrauterine devices, a history of intrauterine interventions, previous abortions, and abnormal uterine bleeding [27]. Endometritis primarily results from infection, which can be attributed to various microorganisms including Ureaplasma urealiticum, Mycoplasma hominis, Streptococcus species, Enterococcus faecalis, Escherichia coli, and others. These findings contribute to a better understanding of the factors associated with chronic endometritis and highlight the importance of exploring both infectious and noninfectious etiologies in clinical assessments [5].

Conclusions

1. The diagnostic value of CD138 immunohistochemical marker in chronic endometritis and its correlation with female infertility has been thoroughly investigated. CD138 expression has been associated with negative pregnancy outcomes, namely in infertile women with endometrial pathology.
2. CD138 immunohistochemical labeling has been shown to enhance the diagnostic rate and precision of CE, particularly in high-risk individuals who have a history of spontaneous abortion, abortion, pelvic inflammation, according to research.
3. Polyps of endometrium were found to be the most prevalent cause of infertility, followed by endometrium hyperplasia, while a significant portion of cases remained unexplained. CD138 expression has been associated with infertility, and its presence in the endometrium may serve as a negative prognostic indicator for pregnancy outcomes.
4. The age was found to be significantly associated with CE in infertile patients, while other factors such as BMI, menstrual characteristics, and reproductive history did not show significant differences between individuals with and without CE.
5. Logistic regression analyses indicated that the infertility type and duration of fertility may be associated with chronic endometritis, while the specific causes of fertility may be linked to a reduced likelihood of CE. However, It is imperative to conduct additional research to clarify the intricate connection between CE and the multitude of factors associated with infertility.

Implications

1. The findings highlight the importance of CD138 immunohistochemical staining as a diagnostic tool for chronic endometritis, particularly in infertile patients with certain risk factors. The incorporation of CD138 assessment into routine clinical practice may improve the accuracy of CE diagnosis and subsequently enhance treatment outcomes.
2. Clinicians should check the expression of CD138 in infertile women who are having fertility evaluation, particularly those who have a history of pelvic inflammation, abortion, spontaneous abortion, mycoplasma infection. Early detection of CE using CD138 staining can help facilitate timely intervention and improve reproductive outcomes.
3. The association between CD138 expression and adverse pregnancy outcomes underscores the need for personalised treatment strategies in infertile patients. Tailoring interventions based on CD138 status and addressing underlying factors contributing to CE may optimize fertility treatment success rates.
4. It is imperative to conduct additional research to examine the cause of chronic endometritis and its correlation with other variables that contribute to infertility. There is a need for longitudinal research to evaluate how CD138 expression affects pregnancy outcomes and to determine the efficacy of targeted therapies. These studies will provide valuable information to influence clinical practice recommendations.
5. Healthcare providers should remain vigilant for chronic endometritis in infertile patients, particularly those with risk factors such as advanced age, history of pregnancy complications, or spontaneous abortion. Multidisciplinary collaboration among obstetricians, gynecologists, and reproductive endocrinologists is essential for a comprehensive management of CE and associated infertility issues.

Declarations

Data Availability Statement

The data provided in this research may be obtained by contacting the corresponding author upon request. The statistics are not publically accessible due to constraints such as privacy or ethical considerations. Requests for the data will be considered on a case-by-case basis to ensure that any potential risks or ethical considerations are addressed appropriately.

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Informed Consent Statement

Informed consent was obtained from all participants before their recruitment, and the research maintained the privacy of participant data at all times.

Conflicts of Interest

The author declares the absence of any potential conflict of interest. Additionally, the author has fully adhered to ethical considerations, encompassing issues such as plagiarism, informed consent, misconduct, data fabrication and/or falsification, simultaneous or duplicate publication and/or submission, and redundancy.

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