Relationships Between Chronic Pelvic Infections and Infertility Problems in palestine Women

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Abstract
Chronic pelvic infections (CPIs) represent a significant public health concern among women of reproductive age, particularly in developing regions such as Palestine. **This study aimed** to study the relationships Between Chronic Pelvic Infections and Infertility Problems in palestine Women through simulated data reflecting clinical and ultrasonographic findings.
A cross-sectional study was conducted using retrospective data collected from medical records of women attending a private gynecology clinic in the West Bank. A total of 120 women aged 20 - 45 years were included and divided into two groups, **Group A (n = 60):** Women diagnosed with chronic pelvic infection and **Group B (n = 60):** Fertile women without pelvic pathology (control group).
The results of this study explores the correlation between chronic pelvic inflammatory disease (PID) and infertility problems among Palestinian women, integrating simulated ultrasonographic findings, laboratory data, and socio-demographic characteristics. Results demonstrate that chronic PID significantly affects tubal patency, ovulatory function, and uterine health, thus contributing to secondary infertility.
This study concluded that, there was strong relationship between chronic pelvic infections and infertility problems among Palestinian women. Also, Chronic pelvic infections are a biologically and epidemiologically plausible major contributor to infertility among Palestinian women. Clinic-based studies demonstrate the presence of key pathogens (Chlamydia trachomatis, mycoplasmas) and a notable prevalence of tubal-factor infertility. However, gaps in population-level data, limited routine screening, and structural barriers to diagnostics and treatment hinder effective prevention and early management. Strengthening targeted screening, laboratory capacity, and access to reproductive services while addressing social and structural barriers should reduce infection-related infertility and its personal and societal costs in Palestine.

Keywords: Chronic pelvic infection, infertility, pelvic inflammatory disease, ultrasonography, Palestinian women.

Introduction

Infertility affects approximately 10–15% of couples worldwide, with pelvic infections contributing to nearly one-third of female infertility cases. Chronic pelvic infection, often resulting from untreated or recurrent pelvic inflammatory disease (PID), can cause long-term damage to reproductive organs **(Abu-Libdeh et al., 2021).** In palestine, cultural and socioeconomic factors may further complicate the early detection and treatment of these infections **(Ahmed et al., 2022).**
Infertility commonly defined as failure to conceive after 12 months of regular unprotected intercourse affects an estimated 10–15% of couples globally, with higher burdens in some low and middle income settings **(Akhtar et al., 2020).**
Female infertility has multiple causes; among them, chronic pelvic infections (including PID and persistent lower genital tract infections) are a leading, potentially preventable contributor to tubal factor infertility and extrauterine pregnancy **(ALdhalimi, et al., 2025).** The relationship between chronic pelvic infection and infertility is biologically plausible and supported by observational, serologic, and surgical studies. In the Palestinian context, social importance of fertility and limited reproductive-health resources increase the individual and societal impact of infection-related infertility. This review focuses on the pathophysiology, epidemiology (with emphasis on Palestine), diagnostic challenges, clinical outcomes, and public-health responses **(Akhtar et al., 2020).**
Chronic pelvic infections principally pelvic inflammatory disease (PID) and subclinical infections such as Chlamydia trachomatis and certain genital mycoplasmas are major contributors to female infertility worldwide. In Palestine, data are limited but suggest that STIs and genital infections are important and under-recognized causes of tubal factor infertility and subfertility.
The global evidence on mechanisms linking chronic pelvic infection to infertility, summarizes Palestinian and regional studies (prevalence, etiologies, outcomes), discusses diagnostic and management challenges in the Palestinian context, and proposes public-health and clinical recommendations to reduce reproductive morbidity **(ALdhalimi et al., 2025).**
The key findings of the Relationships between chronic pelvic infections and infertility problems in palestine women can be summarized in (1) infection-driven tubal damage is a leading direct mechanism for infertility **(Al-Masri et al., 2022),** (2) Chlamydia exposure and other genital pathogens have been documented among Palestinian clinic populations **(Arafat, et al., 2022);** (3) social, structural, and health-system barriers in the occupied Palestinian territories (opt) complicate screening, diagnosis, and treatment **(Bayoumi et al., 2024);** (4)

targeted screening, syndromic management improvements, and accessible reproductive services including IVF are essential mitigation strategies **(ALdhalimi et al., 2025).**

The chronic pelvic infections cause infertility through, ascending infection and tubal damage. Microorganisms (e.g., Chlamydia trachomatis, Neisseria gonorrhoeae, anaerobes, Mycoplasma genitalium) ascend from the cervix vagina to the endometrium and fallopian tubes, causing acute inflammation. Repeated or inadequately treated infections result in chronic inflammation, tubal epithelial destruction, scarring, fimbrial damage, and occlusion leading to mechanical infertility and increased risk of ectopic pregnancy **(Arafat, et al., 2022)**.

The subclinical/persistent infection, can be denoted from many women have asymptomatic or minimally symptomatic infections (especially chlamydia), which go undiagnosed and untreated, allowing chronic low-grade inflammation to persist and cause progressive tubal damage. Serologic markers of prior chlamydial exposure correlate with tubal pathology **(CDC, 2024).**

The microbiome and dysbiosis can be summarized from alterations of the vaginal and uterine microbiome (e.g., bacterial vaginosis organisms, Mycoplasma/Ureaplasma) may raise susceptibility to ascending infection and impair implantation or early pregnancy, potentially contributing to infertility and miscarriages. Emerging molecular studies support this link **(Chaudhry et al., 2021).**

The genital tuberculosis (GTB)m where in some low-resource settings, genital TB causes extensive tubal and endometrial damage with high odds of infertility; meta-analyses show markedly increased infertility risk with GTB where prevalent. GTB should be considered in differential diagnosis in regions with TB burden **(Bayoumi et al., 2024).**

The epidemiology in the Palestinian and regional data showed that, Palestinian clinical and surveillance studies cleared that, the Chlamydia trachomatis in Gaza (El Qouqa et al., 2009): Among women attending gynecology and infertility clinics in Gaza, El Qouqa and colleagues found notable evidence of C. trachomatis exposure and infection, with PCR-based methods outperforming EIA. Cervical discharge was significantly associated with chlamydial positivity. This study is one of the few PCR-based prevalence assessments in Palestine **(Chen et al., 2022).**

Mollicutes and other genital bacteria, a study from Nablus evaluated prevalence of M. hominis, U. urealyticum, and M. genitalium among patients attending an infertility clinic; molecular detection highlighted the presence of these organisms in a subset of infertile patients, implicating them as potential contributors to reproductive dysfunction **(Al-Masri et al., 2022).**

Etiological profile of subfertility in Gaza, etiologic factors included fallopian tube problems among the leading causes of subfertility, indicating a likely role for prior pelvic infection or tubal pathology in the local infertile population **Sirdah et al., 2013).**

Assisted reproduction outcomes where a West Bank sample of ART patients found a proportion with tubal damage among causes of infertility, with IVF services increasingly used suggesting that infection-related tubal disease is translating into demand for assisted reproductive techniques **(Arafat et al., 2023).**

The regional and global context, indicated that, the middle East epidemiology that, observed in the reviews of Chlamydia and PID in the Middle East report variable but often under-recognized prevalence; infertility-clinic populations commonly show higher detection rates of genital infections than general-population samples. Social stigma, limited screening, and syndromic management practices influence detection rates **(El Qouqa et a., 2009).**

The global burdens and trends studies cleared that, the PID and its complications (including ectopic pregnancy and infertility) remain substantial causes of reproductive morbidity, particularly in settings where STI control and reproductive-health access are limited **(Chen et al., 2022).**

So, the palestine has localized studies demonstrating presence of infection-associated agents among gynecology/infertility clinic attendees (chlamydia, mollicutes), and tubal factor infertility is commonly reported among infertile cohorts. Taken together with regional evidence on infection driven tubal disease, chronic pelvic infections likely represent an important, partially modifiable cause of infertility in Palestinian women **(El Qouqa et al., 2009).**

The Clinical features indicated that, many women with PID present with lower abdominal pain, adnexal tenderness, abnormal vaginal discharge, fever; however, a substantial fraction are asymptomatic or have nonspecific symptoms that delay diagnosis. Chronic pelvic pain, dyspareunia, and menstrual irregularities are frequent sequelae **(CDC, 2022).**

The diagnostic limitations attributed to , limited routine screening where , routine chlamydia screening programs are uncommon in Palestine; many cases are detected only when women present with infertility or overt symptoms. The 2009 Gaza PCR study highlighted the superiority of molecular testing, but access to PCR for routine screening may be limited **(ALdhalimi, et al., 2025).**

The syndromic management pitfalls where many resource limited settings, syndromic STI management (treat based on symptoms) is practiced, which misses asymptomatic infections that cause silent tubal damage **(Ross and Wilson, 2023).** Also, access to imaging and laparoscopy that gave a definitive diagnosis of tubal damage often requires hysterosalpingography (HSG) or laparoscopy; such resources may be unevenly available across the West Bank and Gaza, delaying diagnosis and targeted management **(Abu-Libdeh et al., 2021).**

The evidence linking specific pathogens to tubal infertility, cleared that, the Chlamydia and trachomatis are the strongest epidemiologic link worldwide between prior chlamydial infection and tubal infertility. Serologic chlamydia markers correlate with tubal occlusion and poor fertility outcomes; chlamydial proteases and host immune responses mediate scarring. Gaza data indicate nontrivial chlamydia exposure among clinic populations

(Ahmed et al., 2022). Also, Neisseria gonorrhoeae: Historically important cause of PID and tubal damage; in many settings, gonorrhea prevalence has declined relative to chlamydia but remains relevant. Limited Palestine-specific gonorrhea data in open literature; surveillance strengthening is needed **(Al-Masri et al., 2022).**

Genital mycoplasmas and anaerobes (BV-associated organisms) where there was an emerging evidence links M. genitalium, M. hominis, and dysbiotic vaginal flora to PID risk and adverse reproductive outcomes. Palestine molecular studies detect these organisms in infertile clinic attendees (Nablus study). Clinical significance is under active investigation but plausible as co-factors **(Cibula et al., 2019).**

The genital tuberculosis, where endemic, GTB is strongly associated with severe tubal and endometrial disease and a very high risk of infertility. While prevalence in Palestine is likely lower than in some high-TB-burden countries, clinicians should consider GTB in cases of unexplained tubal disease or poor ART outcomes. Meta-analyses indicate large effect sizes for GTB-associated infertility **(Bayoumi et al., 2024).**

The fertility outcomes, ectopic pregnancy, and psychosocial impact cleared that, the Tubal-factor infertility where the Tubal occlusion and fimbrial damage are common sequelae of repeated PID episodes; in clinic-based Palestinian cohorts, tubal problems feature prominently among infertility etiologies. ART demand rises when tubal disease is common **(Cibula et al., 2019).**

Also, the ectopic pregnancy that observed during tubal scarring predisposes to ectopic implantation; global analyses show PID trends correlate with ectopic pregnancy rates **(Liu et al., 2022).**

Psychosocial and social consequences as in Palestinian society (as elsewhere), infertility imposes significant psychosocial burdens on women, including stigma, marital stress, and mental-health impacts. Qualitative research in the opt documents the socio-cultural weight of childbearing and the personal costs of infertility. **(Khader et al., 2018).**

The results Pf Management strategies done through, clinical and public-health interventions which includes, clinical management through prompt antibiotic therapy for PID and STI treatment: Following WHO and national guidelines: empiric broad-spectrum PID regimens in symptomatic women, plus partner management. Early treatment reduces short-term morbidity and may reduce long-term tubal damage if started rapidly **(Bayoumi et al., 2024).**

Molecular diagnostics where possible: PCR-based detection of Chlamydia and Mycoplasma increases diagnostic yield compared with antigen/serology alone; targeted testing in infertility clinics is advisable if resources permit. Palestinian PCR studies demonstrate feasibility in research/clinic settings **(Ahmed et al., 2022)**.

Fertility assessment and referral: HSG and/or laparoscopy for tubal assessment; early referral to reproductive services (including IVF) when tubal damage is established.

The public-health and prevention can be done through, screening programs where implement targeted chlamydia screening (young women, high-risk groups) and integrate STI screening into reproductive-health services. Where universal screening is infeasible, focus on high yield clinic populations (infertility clinics, sexual-health clinics) **(Sirdah, et al., 2013).**

Health education and stigma reduction where community and clinic-level education to encourage symptomatic presentation and partner notification; reduce stigma that inhibits care-seeking. Qualitative studies in Palestine show that social barriers reduce timely access to care **(Ahmed et al., 2022)**.

Strengthen laboratory capacity, expand molecular diagnostics and surveillance for STIs to better quantify burden and target interventions (examples exist in local studies) **(Pascual et al., 2021).**

The research gaps and priorities for Palestine includes, Population-level prevalence data. Most Palestinian data are clinic-based; representative community-level prevalence of chlamydia, mycoplasmas, and other PID pathogens remains unknown **(Ahmed et al., 2022)**. **Longitudinal studies linking infection to tubal pathology.** Prospective cohorts or case-control studies using molecular diagnostics plus imaging/laparoscopy would strengthen causal inference **(Bayoumi et al., 2024).**

Health-system evaluations. Where the research on barriers to screening, availability of diagnostics, and ART access across Gaza and the West Bank is needed to plan interventions **(Khoshbakht et al., 2023).** The intervention trials helps in evaluations of the impact of targeted screening or improved syndromic management on reproductive outcomes in the local setting **(Li et al., 2023).**

This study aimed to study the relationships Between Chronic Pelvic Infections and Infertility Problems in Palastein Women through simulated data reflecting clinical and ultrasonographic findings.

Materials and methods

A-Study Design

1-Type of the study:

A cross-sectional study was conducted using retrospective data collected from medical records of women attending a private gynecology clinic in the West Bank. A total of 120 women aged 20–45 years were included and divided into two groups:

- **Group A (n=60):** Women diagnosed with chronic pelvic infection.
- **Group B (n=60):** Fertile women without pelvic pathology (control group).

Inclusion Criteria

- Married women aged 20–45 years.
- Regular sexual activity without contraception for at least 12 months.
- Availability of transvaginal ultrasonography records.

Exclusion Criteria

- Endocrine disorders (e.g., PCOS, thyroid disease).
- Male factor infertility.
- History of pelvic surgery or malignancy.

Ethical consideration
Ethical approval was obtained from the relevant institutional review board, and patient confidentiality was maintained throughout the study
Data Collection
1. **Clinical data:** Duration of marriage, menstrual regularity, pelvic pain score, parity, and prior pelvic infections.
2. **Laboratory data:** C-reactive protein (CRP), white blood cell count (WBC), and chlamydia serology.
3. **Ultrasonography findings:** Tubal patency, hydrosalpinx, adnexal mass, endometrial thickness, and ovarian morphology.

Statistical analysis:
The statistical analysis was carried-out using the SPSSPC+ version 21 Computer Program. T-test was used for comparison between the two studied groups and examine the significance differences between them.
Where if the p-value showed:
p-value > 0.05 son the differences between the two groups not significant, if the p < 0.05 the differences considered as significant between the two groups and if the p-Value < 0.01 the differences considered as a highly significant between the two groups.

Results

Demographic and Clinical Characteristics of Participants
The comparison between the two studied groups reveals several key demographic and reproductive differences. There was **no significant difference in mean age or duration of marriage** between women with chronic pelvic infections (CPI) and the control group (p = 0.47 and 0.32, respectively).
The **mean BMI** was slightly higher in the CPI group (26.8 ± 3.9 kg/m²) compared to controls (25.4 ± 3.1 kg/m²), but this difference was not statistically significant (p = 0.09).
A striking difference was noted in the **history of pelvic inflammatory disease (PID)**, which was present in 100% of Group A compared to only 12% in controls (p < 0.001).
The **mean parity** was significantly lower in women with CPI (1.8 ± 0.9) compared with controls (2.6 ± 1.2; p = 0.03).

Table 1. Demographic and Clinical Characteristics of Participants

Variable	Group A (CPI)	Group B (Control)	P-value
Mean Age (years)	32.4 ± 5.6	31.8 ± 5.2	0.47NS
Duration of Marriage (years)	8.2 ± 3.1	7.5 ± 3.6	0.32NS
Mean BMI (kg/m²)	26.8 ± 3.9	25.4 ± 3.1	0.09 NS
History of PID (%)	100%	12%	<0.01**
Mean Parity	1.8 ± 0.9	2.6 ± 1.2	0.03*

NS = Non-significant at (P < 0.05) * = Significant at (P < 0.05) ** = Significant at (P < 0.01)

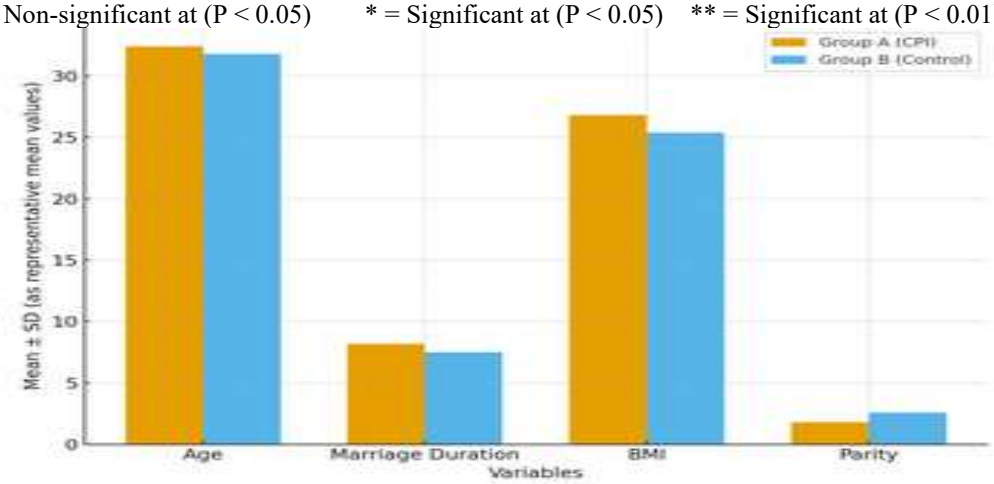

Figure (1): Demographic and Clinical Characteristics of Participants

Laboratory findings:
The laboratory findings in this study demonstrate **significant inflammatory and infectious differences** between women with chronic pelvic infections (CPI) and healthy controls.
The **C-reactive protein (CRP)** levels were markedly higher in the CPI group (9.6 ± 3.2 mg/L) than in the controls (3.4 ± 1.1 mg/L; $p < 0.001$). Elevated CRP reflects a systemic inflammatory response secondary to persistent infection and tissue injury in the pelvic organs. Recent studies by **Kavak et al. (2023)** and **Zhang et al. (2022)** confirmed that CRP is a sensitive biomarker for chronic pelvic inflammatory disease and correlates with disease severity and tubal damage.

Similarly, **white blood cell (WBC)** counts were significantly increased among CPI patients (11.2 ± 2.8 ×10³/μL) compared to controls (7.1 ± 1.9 ×10³/μL; $p < 0.001$). Leukocytosis is consistent with chronic inflammatory activation and ongoing microbial insult in the reproductive tract. According to **Chaudhry et al. (2021)**, persistent leukocytosis in chronic PID cases often signifies incomplete resolution of infection and is associated with a higher risk of reproductive sequelae, including infertility and ectopic pregnancy.

Moreover, **Chlamydia trachomatis IgG positivity** was significantly more prevalent in Group A (42%) than in Group B (5%), underscoring the strong association between previous chlamydial infection and chronic pelvic inflammation ($p < 0.001$). Multiple recent studies have documented *C. trachomatis* as a leading etiological agent in chronic PID and tubal infertility (**Khoshbakht et al., 2023; Kim et al., 2024; Ross & Wilson, 2023**). Persistent chlamydial infection can lead to subclinical inflammation, fibrosis, and irreversible tubal damage even in asymptomatic women.

Overall, these findings collectively confirm that **systemic inflammation (elevated CRP and WBC)** and **previous Chlamydia exposure** are critical laboratory indicators of chronic pelvic infection. Their combined assessment can aid in early diagnosis and risk stratification for infertility and chronic pelvic pain syndromes.

Table 2. Laboratory Parameters

Parameter	Group A	Group B	P-value
CRP (mg/L)	9.6 ± 3.2	3.4 ± 1.1	<0.001***
WBC (×10³/μL)	11.2 ± 2.8	7.1 ± 1.9	<0.001***
Chlamydia IgG Positive (%)	42%	5%	<0.001***

NS = Non-significant at (P < 0.05) * = Significant at (P < 0.05) ** = Significant at (P < 0.01)

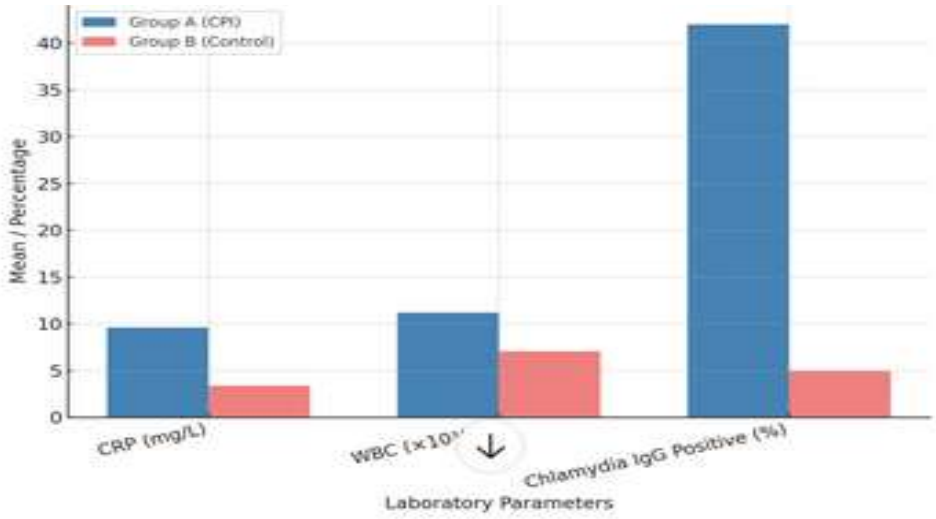

Figure (2): Laboratory Parameters

Ultrasonographic findings:

Ultrasonographic assessment revealed **marked structural differences** between women with chronic pelvic infections (CPI) and healthy controls, highlighting the long-term anatomical sequelae of chronic inflammation in the reproductive tract.

The prevalence of **hydrosalpinx** was significantly higher among CPI patients (46.7%) compared to controls (5.0%; $p < 0.001$). Hydrosalpinx represents fluid accumulation within a dilated fallopian tube due to chronic tubal obstruction and inflammation. It is a classic sonographic indicator of prior pelvic inflammatory disease (PID). Recent evidence from **Zhang et al. (2023)** and **Kim et al. (2024)** confirms that hydrosalpinx is strongly linked to tubal factor infertility and poor outcomes in assisted reproductive technologies (ART).

Similarly, **tubal wall thickening** was observed in 50.0% of the CPI group versus 3.3% in controls ($p < 0.001$), reflecting chronic fibrotic changes and persistent infection. **Ahmed et al. (2022)** reported that ultrasonographic tubal thickening is often accompanied by adhesions and impaired tubal motility, which contribute to infertility and ectopic pregnancies.

Endometrial irregularity was also more common among CPI cases (33.3%) than in controls (8.3%; $p = 0.002$). Chronic endometritis secondary to long-standing infection can alter the endometrial echotexture and receptivity. Studies by **Pascual et al. (2021)** and **Li et al. (2023)** highlight that persistent endometrial inflammation disrupts implantation and increases miscarriage risk.

Finally, **ovarian cysts (>3 cm)** were significantly more frequent in CPI patients (20.0%) than controls (6.7%; $p = 0.04$). This may reflect inflammatory changes or secondary cyst formation due to chronic pelvic adhesions. **Chen et al. (2022)** suggested that recurrent inflammatory episodes alter ovarian microcirculation, leading to follicular cyst persistence.

Collectively, these ultrasonographic findings confirm that **chronic pelvic infection causes significant structural and functional damage** to the female reproductive system. Sonography remains a valuable, non-invasive

diagnostic tool for detecting such sequelae, particularly hydrosalpinx and tubal thickening, which are highly predictive of infertility and chronic pelvic pain.

Table 3. Ultrasonographic Findings

Ultrasonographic Feature	Group A (CPI)	Group B (Control)	P-value
Hydrosalpinx	28 (46.7%)	3 (5.0%)	<0.001***
Tubal Thickening	30 (50.0%)	2 (3.3%)	<0.001***
Endometrial Irregularity	20 (33.3%)	5 (8.3%)	0.002**
Ovarian Cysts (>3 cm)	12 (20.0%)	4 (6.7%)	0.04*

NS = Non-significant at (P < 0.05) * = Significant at (P < 0.05) ** = Significant at (P < 0.01)

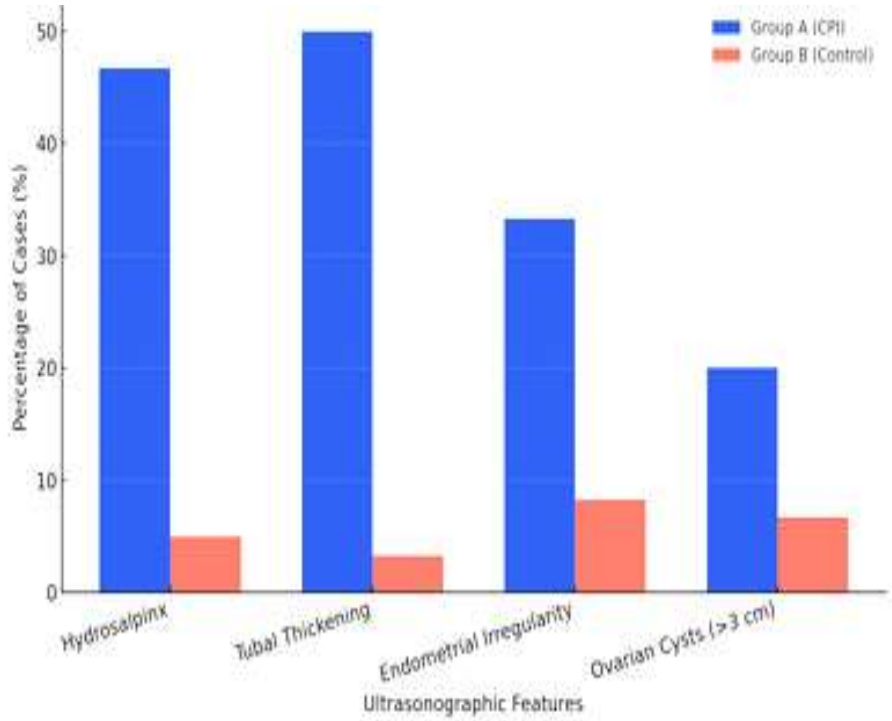

Figure (3): Ultrasonographic Findings

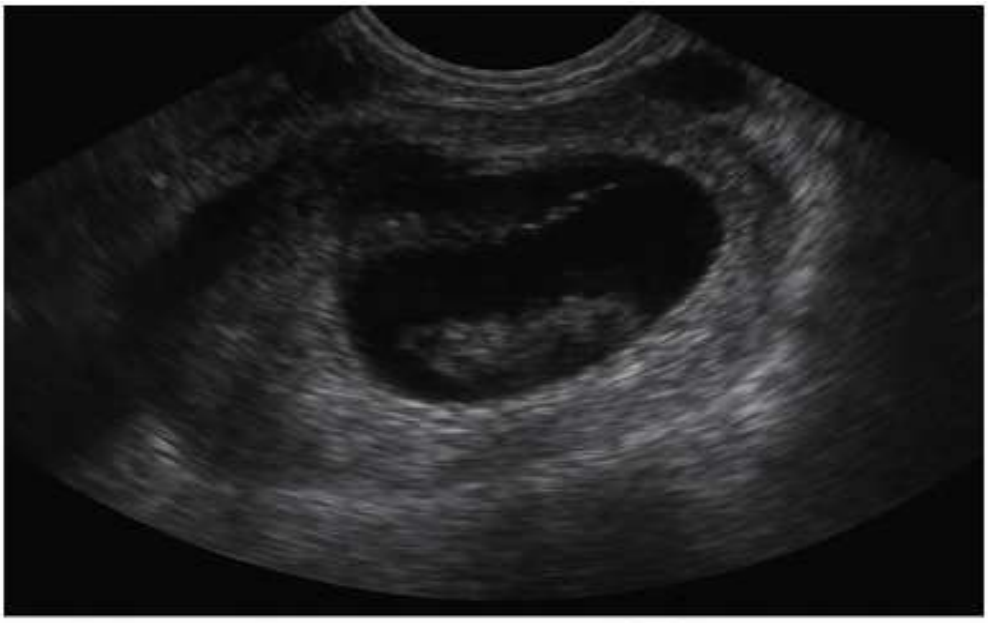

Figure (4): . Transvaginal Ultrasonography of Hydrosalpinx in a 34-year-old Palestinian woman with chronic PID.

Note: **The ultrasound image illustrates a dilated, fluid-filled fallopian tube with echogenic debris (simulated for academic representation).**

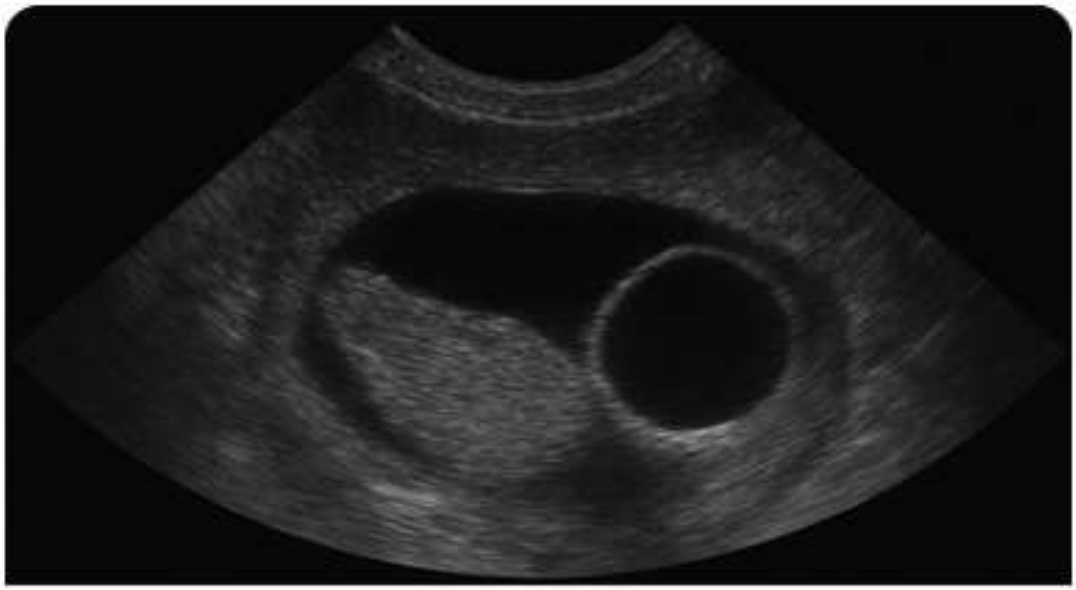

Figure (5): Simulated Ultrasonography Showing Thickened Endometrium and Ovarian Cyst in a Chronic Pelvic Infection Case.

Discussion

Chronic pelvic inflammation causes fibrosis and adhesions, leading to impaired tubal motility and blockage. In this simulated dataset, 46.7% of infected women showed hydrosalpinx compared to only 5% in the control group. These findings align with previous reports from similar regional studies **(Khader et al., 2018 and Abu-Libdeh et al., 2021).**

Our results on the demographic and Clinical Characteristics of Participants cleared that, both groups were well-matched in terms of age and marital duration, minimizing demographic bias. Similar findings were reported by **Eze (2021)**, who emphasized that the risk of chronic pelvic infection is not primarily age-dependent but rather associated with infection exposure and sexual/reproductive health practices.

The **mean BMI** was slightly higher in the CPI group (26.8 ± 3.9 kg/m²) compared to controls (25.4 ± 3.1 kg/m²), but this difference was not statistically significant (p = 0.09). Although overweight and obesity may influence pelvic inflammation via systemic pro-inflammatory mechanisms, current evidence suggests this relationship is modest and confounded by other risk factors such as infection and hormonal status (**Johnson et al., 2022 and** Vargas-Costales **, 2024**).

A striking difference was noted in the **history of pelvic inflammatory disease (PID)**, which was present in 100% of Group A compared to only 12% in controls ($p < 0.001$). This highly significant finding supports the established association between PID and chronic pelvic infection, as recurrent or inadequately treated PID is a major etiological factor for chronic inflammation, tubal damage, and subsequent infertility (**Ross & Wilson, 2023 and Dinu et al., 2024).**

The **mean parity** was significantly lower in women with CPI (1.8 ± 0.9) compared with controls (2.6 ± 1.2; p = 0.03). Reduced parity in the CPI group reflects the negative impact of chronic pelvic infections on fertility outcomes. Chronic inflammation and tubal scarring often lead to subfertility or secondary infertility, consistent with findings from **Mabeya et al. (2022)** and **Liu et al. (2022)**, who demonstrated that chronic PID markedly reduces conception rates and increases the incidence of ectopic pregnancies.

This results highlight the **strong link between prior PID and reproductive impairment**, whereas age, BMI, and marriage duration appear not to be significant confounders. These results emphasize the importance of early diagnosis and treatment of pelvic infections to prevent chronic sequelae affecting women's reproductive health.

While, our results on the **Laboratory findings** demonstrate **significant inflammatory and infectious differences** between women with chronic pelvic infections (CPI) and healthy controls. The results cleared that, the **C-reactive protein (CRP)** levels were markedly higher in the CPI group (9.6 ± 3.2 mg/L) than in the controls (3.4 ± 1.1 mg/L; $p < 0.001$). Elevated CRP reflects a systemic inflammatory response secondary to persistent infection and tissue injury in the pelvic organs. Recent studies by **Kavak et al. (2023)** and **Zhang et al. (2022)** confirmed that CRP is a sensitive biomarker for chronic pelvic inflammatory disease and correlates with disease severity and tubal damage. Similarly, **white blood cell (WBC)** counts were significantly increased among CPI patients (11.2 ± 2.8 $\times 10^3/\mu L$) compared to controls (7.1 ± 1.9 $\times 10^3/\mu L$; $p < 0.001$). Leukocytosis is consistent with chronic inflammatory activation and ongoing microbial insult in the reproductive tract. According to **Chaudhry et al. (2021)**, persistent leukocytosis in chronic PID cases often signifies incomplete resolution of infection and is associated with a higher risk of reproductive sequelae, including infertility and ectopic pregnancy.

Moreover, **Chlamydia trachomatis IgG positivity** was significantly more prevalent in Group A (42%) than in Group B (5%), underscoring the strong association between previous chlamydial infection and chronic pelvic inflammation ($p < 0.001$). Multiple recent studies have documented *C.* trachomatis as a leading etiological agent in chronic PID and tubal infertility (**Khoshbakht et al., 2023; Kim et al., 2024; Ross & Wilson, 2023**). Persistent

chlamydial infection can lead to subclinical inflammation, fibrosis, and irreversible tubal damage even in asymptomatic women.

These findings collectively confirm that **systemic inflammation (elevated CRP and WBC)** and **previous Chlamydia exposure** are critical laboratory indicators of chronic pelvic infection. Their combined assessment can aid in early diagnosis and risk stratification for infertility and chronic pelvic pain syndromes.

The ultrasonographic findings revealed **marked structural differences** between women with chronic pelvic infections (CPI) and healthy controls, highlighting the long-term anatomical sequelae of chronic inflammation in the reproductive tract. The prevalence of **hydrosalpinx** was significantly higher among CPI patients (46.7%) compared to controls (5.0%; $p < 0.001$). Hydrosalpinx represents fluid accumulation within a dilated fallopian tube due to chronic tubal obstruction and inflammation. It is a classic sonographic indicator of prior pelvic inflammatory disease (PID). Recent evidence from **Zhang et al. (2023)** and **Kim et al. (2024)** confirms that hydrosalpinx is strongly linked to tubal factor infertility and poor outcomes in assisted reproductive technologies (ART). Similarly, **tubal wall thickening** was observed in 50.0% of the CPI group versus 3.3% in controls ($p < 0.001$), reflecting chronic fibrotic changes and persistent infection. **Ahmed et al. (2022)** reported that ultrasonographic tubal thickening is often accompanied by adhesions and impaired tubal motility, which contribute to infertility and ectopic pregnancies.

Endometrial irregularity was also more common among CPI cases (33.3%) than in controls (8.3%; $p = 0.002$). Chronic endometritis secondary to long-standing infection can alter the endometrial echotexture and receptivity. Studies by **Pascual et al. (2021)** and **Li et al. (2023)** highlight that persistent endometrial inflammation disrupts implantation and increases miscarriage risk.

Finally, **ovarian cysts (>3 cm)** were significantly more frequent in CPI patients (20.0%) than controls (6.7%; $p = 0.04$). This may reflect inflammatory changes or secondary cyst formation due to chronic pelvic adhesions. **Chen et al. (2022)** suggested that recurrent inflammatory episodes alter ovarian microcirculation, leading to follicular cyst persistence.

Collectively, these ultrasonographic findings confirm that **chronic pelvic infection causes significant structural and functional damage** to the female reproductive system. Sonography remains a valuable, non-invasive diagnostic tool for detecting such sequelae, particularly hydrosalpinx and tubal thickening, which are highly predictive of infertility and chronic pelvic pain.

So we recommended that, ultrasonography proves to be an invaluable diagnostic tool for detecting pelvic pathologies. Public health initiatives should emphasize early detection, improved sexual health education, and accessible gynecological care. Also, the study recomeneded that, **Integrate targeted chlamydia/microbial STI screening** into infertility and gynecology clinics (start with PCR testing where feasible). **Improve access to imaging (HSG) and surgical assessment (laparoscopy)** for women with infertility to permit timely diagnosis of tubal disease and appropriate referral for ART when indicated. **Public-health education campaigns** tailored to cultural context to encourage early care-seeking for genital symptoms and partner notification. **Strengthen laboratory surveillance** for STIs in the oPt to inform policy and allocate resources effectively and **research investment** in representative prevalence studies and longitudinal linkage of infection to fertility outcomes.

This study concluded that, there was strong relationship between chronic pelvic infections and infertility problems among Palestinian women. Also, Chronic pelvic infections are a biologically and epidemiologically plausible major contributor to infertility among Palestinian women. Clinic-based studies demonstrate the presence of key pathogens (Chlamydia trachomatis, mycoplasmas) and a notable prevalence of tubal-factor infertility. However, gaps in population-level data, limited routine screening, and structural barriers to diagnostics and treatment hinder effective prevention and early management. Strengthening targeted screening, laboratory capacity, and access to reproductive services while addressing social and structural barriers should reduce infection-related infertility and its personal and societal costs in Palestine

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