

Dermatological Findings among Infertile Females in Duhok City, Iraq (2023)

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Abstract

Background: Dermatological diseases are among the most common health problems observed in infertile women. This study, conducted from April to September 2023, aimed to determine the prevalence of dermatological disorders among infertile women in Duhok City, Iraq.

Methods: A descriptive cross-sectional study was carried out among 100 infertile women in Kurdistan, northern Iraq, using a convenience sampling method. Data were collected through a structured and validated questionnaire. Clinical assessment focused on hirsutism, acne, androgenetic alopecia (AGA), acanthosis nigricans, and other dermatological manifestations, with an evaluation of their duration, distribution, and severity. Standard dermatological clinical guidelines were applied.

Results: The most common dermatological finding was seborrhea, observed in 71 (71%) women. Acne was present in 43 (43%) women, with acne grading as follows: 26 (26%) with grade 1, 13 (13%) with grade 2, and 4 (4%) with grade 3. Hirsutism was observed in 37 (37%) women. AGA was detected in 35 (35%) women, with severity scores distributed as follows: 18 (18%) with a score of 1, 14 (14%) with a score of 2, 1 (1%) with a score of 3, and 2 (2%) with a score of 4. Other dermatological findings included hidradenitis suppurativa in 2 (2%), skin tags in 10 (10%), warts in 2 (2%), and linea nigra in 4 (4%) women. Additionally, 40 (40%) had hypertrichosis, 39 (39%) had hyperhidrosis, 16 (16%) had eczema, 9 (9%) had dermatophytosis, and 27 (27%) had melasma or facial melanosis.

Conclusion: This study demonstrated a high prevalence of dermatological disorders among infertile women. Health care providers should consider the interplay between infertility and skin conditions during evaluation and management. An integrated approach may aid in identifying underlying causes of infertility and associated dermatological manifestations, thereby improving both clinical outcomes and quality of life.

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Introduction

Dermatological diseases are among the most common health problems worldwide, with an estimated 21–87% of individuals experiencing at least one type of skin disorder. Despite their high prevalence, their importance

is often underestimated due to their chronic nature and relatively low mortality rates.¹ These disorders represent the fourth leading cause of non-fatal disease burden globally.² Epidemiological studies have shown that acne vulgaris (AV) is the most frequently diagnosed skin disorder by American dermatologists, affecting

approximately 80% of adolescents aged 12 to 18 years.²

The negative impact of dermatological diseases such as AV, vitiligo, eczema, psoriasis, and hair disorders is influenced by several factors, including disease activity, location, the body areas affected, and associated symptoms such as pain and itching.³ Patients with atopic eczema, hand eczema, hidradenitis suppurativa, psoriasis, and acne are at increased risk of developing depression.⁴ Moreover, significant associations have been reported between acne, eczema, and psoriasis with suicidal ideation.⁴ Assessing the burden of dermatological diseases is therefore essential for evidence-based resource allocation and for situating dermatology within a global health perspective.⁵

Various factors can influence the onset, cause, and progression of dermatological diseases in women. One such factor is infertility, which can impact the development and progression of skin disorders through mechanisms such as altered gene expression, hormonal imbalances, immune system dysfunction, epigenetic changes, and alterations in skin anatomy.⁶ Infertility is defined as the inability to achieve pregnancy after 12 months or more of regular, unprotected intercourse, and is considered a reproductive disorder.⁷ Research has demonstrated that hidradenitis suppurativa is associated with infertility in women of all reproductive age groups, particularly among those aged 36 to 45 years. Furthermore, studies have shown that atopic dermatitis is linked to a higher prevalence of infertility.⁷

According to the available information and evidence, infertility and dermatological disorders may share an epidemiological relationship; however, current data on this association remain limited. Epidemiological studies are crucial for enhancing our understanding of the relationship between infertility and dermatological diseases, and can contribute to a more effective allocation of healthcare resources. In other words, identifying the prevalence of skin disorders and the factors influencing them not only enhances the quality of life of patients but also supports the development of health and treatment policies at both national and international levels. Since the prevalence of dermatological diseases can vary across countries and ethnic groups, this study aimed to identify the prevalence of dermatological disorders among infertile women in Duhok City, Iraq.

Methods

Study Design and Participants

This descriptive cross-sectional study was conducted from April to September 2023 at the Gynecology and Obstetrics Department of Azadi Teaching Hospital in Duhok City, Kurdistan, Iraq.

The target population consisted of infertile women residing in Kurdistan who attended the department for treatment or follow-up and were registered at the hospital.

Inclusion criteria were infertile women aged 18–45 years who were willing to participate in the study.

Exclusion criteria included women who were menopausal, those with male-factor infertility, pregnant women, or women with concurrent conditions that could lead to hormonal imbalance (e.g., ovarian or adrenal neoplasms). Additional exclusion criteria were the use of hormone therapy (e.g., oral contraceptives or anti-androgens), autoimmune disease, ovarian pathology such as tumors or cysts, use of insulin sensitizers, clinical Cushing's disease, or diabetes.

A convenience sampling method was used to select 100 infertile women aged 18–45 years who sought treatment or follow-up at the hospital. The sample size was determined with consideration for statistical representativeness, though the limitations of convenience sampling are acknowledged. Infertility was defined as the inability to conceive a live pregnancy after 12 months of unprotected intercourse. The researcher visited the hospital five times per week, for four hours per day, to recruit participants.

Ethical approval was obtained from the Scientific Committee, Board of Specialists/Council at the Department of Dermatology, and from the Knowledge, Health, and Community Management System (KHCMS). Azadi Teaching Hospital also granted permission. Data collection was treated as confidential and was not disclosed for purposes beyond the study.

Measures

Data were collected using a structured and validated questionnaire. The questionnaire was developed through a rigorous process, including item generation, expert review, pilot testing, and validation, to ensure reliability and accuracy. It included sections on demographic characteristics, medical history, and a detailed examination of dermatological conditions.

Clinical guidelines and references were followed to assess the presence of acne, hirsutism, acanthosis nigricans, androgenic alopecia, and other dermatological conditions. Demographic variables included age, occupation, number of children, height, and weight. Disease-related information included family history of infertility among siblings, type of infertility, gravidity and parity (GPA), history of ovulation-inducing drugs, number of in vitro fertilization (IVF) trials, presence of polycystic ovary syndrome (PCOS), pelvic inflammatory disease (PID), number of pelvic surgeries or trauma, and presence

of galactorrhea. Medical history included diabetes mellitus (DM), hypertension (HTN), ischemic heart disease (IHD), epilepsy, and hypothyroidism.

A comprehensive dermatological examination was conducted to assess acne, hirsutism, acanthosis nigricans, androgenic alopecia, and other skin disorders. Each condition was evaluated in terms of duration, distribution, and severity scoring.

Hirsutism was graded according to body hair distribution using the modified Ferriman–Gallwey score (mFGS). Acne severity was classified as follows:

Mild: presence of open and closed comedones with few inflammatory papules and pustules; Moderate: papules and pustules primarily localized to the face; Moderately severe: numerous papules and pustules with occasional inflamed nodules on the face, chest, and back; and Severe: extensive painful nodules, pustules, and cysts.

Androgenic alopecia (AGA) was assessed using the Sinclair scale for female pattern hair loss, where stage 1 was considered normal, stage 2 indicated widening of the central part, stage 3 represented widening of the central part with volume reduction from the part line, stage 4 denoted the development of a bald spot in the frontal area, and stage 5 reflected advanced hair loss. Seborrhea was diagnosed based on the presence of dry, scaly scales on the scalp (dandruff or pityriasis simplex capillitia) or erythematous patches with yellow-gray scales, typically appearing on the face, scalp, upper chest, and back (seborrheic dermatitis). The clinical diagnosis of acanthosis nigricans (AN) was made by identifying dark, coarse, thickened skin with a velvety texture symmetrically distributed over the neck, axilla, frontal and popliteal cavities, and groin folds. Skin tags and stretch marks were clinically diagnosed through direct skin examination.

In this study, infertility was defined according to the World Health Organization (WHO) criteria. Primary infertility refers to women who have never been able to conceive despite having regular, unprotected sexual intercourse for at least 12 months.

In this study, participants classified under this category had no prior pregnancies. Secondary infertility was defined as the inability to conceive again after at least 12 months of regular, unprotected sexual intercourse in women who had previously conceived, regardless of the pregnancy outcome (live birth, miscarriage, or ectopic pregnancy). Based on these definitions, participants were classified into primary or secondary infertility groups according to their reproductive histories, which were obtained through a structured questionnaire. These classifications were crucial for delineating the study's scope and accurately characterizing the fertility issues of the participants.

Data Analysis

Data were analyzed using SPSS version 20. Descriptive statistics, including mean, standard deviation (SD), frequencies, and percentages, were calculated to summarize and describe the key features of the data. The choice of statistical tests was guided by the nature and distribution of the variables to ensure appropriate analysis and accurate interpretation of the findings.

Results

The mean age of the participants was 33.68 ± 6.77 years, with a range of 18 to 45 years. The mean weight was 69.73 ± 12.82 kg, and the mean height was 158.95 ± 4.50 cm. The mean body mass index (BMI) was 27.54 ± 4.84 kg/m², ranging from 18.3 to 39.1 kg/m². The mean waist circumference was 86.47 ± 12.69 cm. Regarding residence, 49 (49%) of the surveyed women lived within the city of Duhok. The majority of participants, 68 (68%), were homemakers. Table 1 summarizes the demographic characteristics of the study subjects.

The gynecological status of the participants is presented in Table 2. Regarding family history of infertility among siblings, 28 (28%) women reported a positive history. Analysis of infertility type revealed that 56 (56%) women had primary infertility, while 44 (44%) had secondary infertility. The duration of marriage showed that 13 (13%) women had been

Table 1: Demographic characteristics of study participants (n=100)

Characteristic's	Min	Max	Mean±SD
Age (year)	18	45	33.68±6.776
Weight (kg)	45	109	69.73±12.823
High (cm ²)	143	172	158.95±4.507
BMI (kg/m ²)	18.3	39.1	27.54±4.846
Waist (cm)	40	120	86.47±12.696
Residency	Inside Duhok		49 (49%) *
	Outside Duhok		51 (51%)
Job	House wife		68(68%)
	Private. Employee		5 (5%)
	Gove. Employee		20(20%)
	Student		2 (2%)
	Without Job		5 (5%)

*Frequency (%)

married for less than 10 years, whereas 87 (87%) had been married for more than 10 years. Additionally, 8 (8%) women had a history of undergoing in vitro fertilization (IVF). Examination of polycystic ovary syndrome (PCOS) indicated that 49 (49%) of the participants had a positive history.

The prevalence of dermatological disorders among the participants is presented in Table 3. The most common dermatological finding was seborrhea, observed in 71 (71%) women. Acne was present in 43 (43%) women, with severity classified as follows: 26 (26%) women had mild acne (Scale class 1), 13 (13%) had moderate acne (Scale class 2), and 4 (4%) had moderately severe acne (Scale class 3). Hirsutism was observed in 37 (37%) women. Androgenic alopecia (AGA) was detected in 35 (35%) women, with scores distributed as follows: 18 (18%) women had a score of 1, 14 (14%) had a score of 2, 1 (1%) had a score of 3, and 2 (2%) had a score of 4. Other dermatological findings included hidradenitis suppurativa in 2 (2%) women, skin tags in 10 (10%), warts in 2 (2%), and linea nigra in 4 (4%) women. Additionally, 40 (40%) women had hypertrichosis, 39 (39%) had hyperhidrosis, and 16 (16%) had eczema. Dermatophytosis was observed in 9 (9%) women, and melasma or facial melanosis was present in 27 (27%) women.

Discussion

The results of this study provide a comprehensive overview of various skin disorders among infertile Iraqi women. It has been reported that nearly 50% of infertility cases are attributed to genetic and hereditary factors.⁸ In the present study, more than a quarter of women reported a family history of infertility in siblings, which aligns with the findings of Woolner et al.⁹ The majority of the women in this study experienced primary infertility,

indicating that they had never been pregnant, a result consistent with the findings of Maharlouei et al. (2021) in Iran.¹⁰ Polycystic ovary syndrome (PCOS) is one of the most common and complex endocrine disorders affecting women of reproductive age, often manifesting with infertility and dermatological issues. More than 20% of women with infertility are affected by PCOS.¹¹ Furthermore, PCOS increases the risk of associated conditions, such as insulin resistance—reported in over 60% of patients—type 2 diabetes, cardiovascular diseases, and endometrial tumors, and it may contribute to psychological challenges, including nervous tension and depression.¹¹

According to previous studies, an increased frequency of pelvic inflammatory disease (PID) in women is associated with a higher risk of infertility.¹² The results of the present study showed that more than one-third of infertile women had a history of PID, which is consistent with other reports indicating that over a quarter of infertile women experience PID.¹² Additionally, certain dermatological disorders, including atopic dermatitis and eczema, have been identified as potential risk factors for infertility.¹³ In the current study, a wide range of dermatological findings was observed among infertile women. This study aimed to investigate both the frequency and pattern of dermatological problems in this population. Notably, seborrhea was the most common dermatological finding among the participants, a result that aligns with the findings of Eİ Doğan and F. Kaya in Turkey.¹⁴

The results of this study revealed that hirsutism is one of the most common dermatological findings among infertile women. This condition may arise from increased androgen levels or heightened sensitivity to normal androgen levels.¹⁵ Similarly, studies conducted by Chin et al. in the United States

Table 2: Gynecological status in study participants (n=100)

Characteristic's	Class	Frequency	Percent
Family history of infertility in siblings	Yes	28	28
	No	72	72
Type of infertility	Primary	56	56
	Secondary	44	44
Married before (in years)	<10	13	13
	≥10	87	87
Trial of IVF	Yes	8	8
	No	92	92
PCOS*	Yes	49	49
	No	51	51
Pelvic Surgeries or trauma	Yes	27	27
	No	73	73
Hx of ovulation-inducing drugs	Yes	41	41
	No	59	59
PID**	Yes	36	36
	No	64	64
Galactorrhea	Yes	35	35
	No	65	65

*Polycystic Ovary Syndrome, **Pelvic inflammatory Disease

Table 3: Dermatological findings in study participants (n=100)

Characteristic's	Class	Frequency	Percent
Hirsutism	Yes	37	37
	No	63	63
AGA	Yes	35	35
	No	65	65
AGA Score	1	18	18
	2	14	14
	3	1	1
	4	2	2
Acne	Yes	43	43
	No	57	57
Acne Scale	1	26	26
	2	13	13
	3	4	4
Acanthosis nigricans	Yes	28	28
	No	72	72
Striae	Yes	35	35
	No	65	65
Dry Skin	Yes	44	44
	No	56	56
Hidradenitis Suppurativa	Yes	2	2
	No	98	98
Skin Tags	Yes	10	10
	No	90	90
Warts	Yes	2	2
	No	98	98
Linea nigra	Yes	4	4
	No	96	96
Seborrhea	Yes	71	71
	No	29	29
Hypertrichosis	Yes	40	40
	No	60	60
Hyperhidrosis	Yes	39	39
	No	61	61
Eczema	Yes	16	16
	No	84	84
Dermatophytosis	Yes	9	9
	No	91	91
Melasma or facial melanosis	Yes	27	27
	No	73	73

investigating hirsutism reported it as a frequent finding among women, which aligns with the results of the present study.¹⁶ Androgenic alopecia (AGA) was also identified as a common cause of hair loss in women, corroborating findings from other studies that highlight its significance as a dermatological challenge.¹⁷ Acne was another prevalent dermatological finding among infertile women in this study. When acne is hormonally driven, it can contribute to infertility, and women with both a history of acne and polycystic ovary syndrome (PCOS) may be at increased risk of fertility issues.¹⁸ Additionally, the present study identified eczema as a notable dermatological finding. Previous research has similarly shown that women with eczema and other forms of dermatitis may have an increased risk of infertility.¹⁹

The results of the present study revealed that among infertile women, the spectrum of dermatological

disorders is diverse, with multiple types of skin conditions identified. Moreover, a significant correlation was observed between dermatological findings and infertility. These findings align with previous studies,²⁰ indicating that dermatological disorders can have a high prevalence in this population, and that attention to factors influencing these conditions may be beneficial for clinical assessment and management.

This study identified a significant prevalence of dermatological disorders among infertile women in Duhok City, Iraq. Seborrhea was the most common finding, observed in 71% of participants. This condition, characterized by excessive sebum production, is often associated with hormonal imbalances, particularly elevated androgens, which stimulate the sebaceous glands and may lead to seborrheic dermatitis. In infertile women, especially

those with PCOS, high androgen levels are common, which likely explains the high prevalence of seborrhea. Hormonal treatments prescribed for infertility may also contribute to its development or exacerbation.

Acne was observed in 43% of participants, primarily caused by the blockage of hair follicles by sebum and dead skin cells, which leads to inflammation. Like seborrhea, acne is closely associated with androgen levels, and its prevalence in this study may reflect the elevated androgens in women with infertility. Additionally, stress and certain fertility treatments could exacerbate acne by further disrupting hormonal balance.

Hirsutism, present in 37% of participants, is characterized by excessive hair growth in areas typically associated with male hair patterns, resulting from hyperandrogenism or increased follicular sensitivity to androgens. Its prevalence in infertile women is likely linked to PCOS and other conditions associated with androgen excess, with fertility treatments potentially intensifying the condition.

Androgenic alopecia (AGA), observed in 35% of participants, is a form of hair loss caused by androgen-driven miniaturization of hair follicles. Its occurrence in this population reflects underlying hormonal imbalances, with stress and anxiety related to infertility potentially exacerbating the condition.

Hypertrichosis (40%) and hyperhidrosis (39%) were also noted, with the former characterized by excessive hair growth that is not necessarily androgen-dependent, and the latter referring to excessive sweating. These conditions may be associated with general endocrine disturbances or stress-related factors in infertile women, particularly those undergoing hormonal treatments.

Eczema, present in 16% of participants, is a chronic inflammatory skin condition influenced by stress, immune dysfunction, and environmental factors; its prevalence in infertile women may be linked to the emotional strain of infertility and hormonal fluctuations. Finally, melasma, also known as facial melanosis, was observed in 27% of participants. This condition, characterized by hyperpigmented patches on the face, is often associated with hormonal changes, particularly involving estrogen and progesterone. Hormonal treatments for infertility, along with stress, may contribute to the development or worsening of melasma in this population.

Findings

The findings of this study indicate a notably high prevalence of dermatological conditions among infertile women, which appears to be closely linked to underlying hormonal imbalances commonly observed in this population, such as those associated with PCOS.

Infertility treatments, particularly those involving hormonal manipulation, may further contribute to the development or exacerbation of these skin conditions. Additionally, stress and emotional factors related to infertility may compound these dermatological issues, influencing their severity and presentation.

Future research should focus on longitudinal studies to elucidate the causal relationships between infertility, its treatments, and associated dermatological conditions. Moreover, integrating strategies to manage stress and support skin health into the care of women undergoing infertility treatments may help improve both dermatological and reproductive outcomes.

Limitations

This study provides valuable insights into the prevalence of dermatological disorders among infertile women in Duhok City. However, the small sample size, single-center design, and lack of a control group limit the generalizability of the findings. Future research should include larger, multi-center studies with control groups better to elucidate the relationship between infertility and skin disorders. Additionally, the potential impact of infertility treatments on dermatological health was not considered in this study. Hormonal therapies and other infertility interventions may exacerbate existing skin conditions or contribute to new dermatological issues. Future studies should investigate the specific types of treatments used and their potential effects on skin health.

Conclusion

The results of the present study demonstrate a significant prevalence of dermatological diseases among infertile women. These findings are particularly important because factors contributing to infertility may also be associated with the development of skin disorders. Infertility is a complex condition with physical, mental, spiritual, and medical implications for women. The epidemiological insights provided by this study highlight the need for comprehensive healthcare approaches that address both reproductive and dermatological health. Healthcare providers should consider the interplay between infertility and skin conditions when evaluating and managing patients. Such an integrated approach can help identify and address underlying causes of infertility and related dermatological issues, ultimately improving the overall quality of life for these women.

Authors' Contribution

Rezheen Abdullah Ismael: Conceptualized and designed the study, conducted data collection and dermatological examinations, performed statistical analysis, and drafted the manuscript. Dindar Sharif Qurtas: Provided

expert dermatological oversight, supervised clinical methodology, and contributed to manuscript review and refinement. Abdulrahman Omer Abdulrahman: Assisted in participant recruitment, coordinated hospital permissions, and contributed to data interpretation and manuscript editing.

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Conflict of Interest

The authors declare that they have no conflicts of interest.

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