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The Role Of Cortisol As A Neuroendocrine Marker In Fertility Among Pakistani Married Couples Exploring The Impact Of Stress Hormones On Reproductive Outcomes

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Abstract

This study explains that infertility is not only a medical issue but also a psychological and social problem that affects couples' emotional well-being. Stress plays an important role in fertility, and cortisol, a stress hormone, can influence reproductive health.The aim of this qualitative study was to understand how married couples in Pakistan experience stress and cortisol when facing fertility problems. An interpretative phenomenological approach (IPA) was used, and in-depth interviews were conducted with 30 participants (15 married couples).The results showed that many participants experienced long-term stress, which they believed affected their hormonal balance and reduced their chances of having children. Participants also viewed cortisol as a hormone that increases with stress and negatively impacts fertility.Differences between men and women were also observed. Women reported more emotional stress, self-blame, and social pressure, while men talked about hidden stress related to responsibility and social expectations. Family pressure, marital issues, and daily life problems further increased stress levels.Overall, the study highlights that psychological stress should be considered along with medical treatment in fertility care.

Keywords: Stress, Cortisol, Infertility, Fertility, Pakistani Married Couples, Psychological Stress

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Introduction

Fertility is an important part of human life and is closely linked with family, relationships, and social expectations. In many cultures, including Pakistan, having children is highly valued, and infertility can cause emotional and social stress. Medically, infertility is defined as the inability to conceive after one year of unprotected intercourse. However, it is not only a physical condition but also a psychological and social experience.

Stress, Cortisol, and Reproductive Health

Fertility is controlled by a complex hormonal system. Cortisol, a stress hormone, plays an important role in this process. High levels of stress can disturb hormonal balance and affect reproductive health. In women, it may disrupt ovulation, and in men, it may affect sperm production. This can lead to reduced chances of conception. Chronic stress can also affect blood flow to reproductive organs and increase the risk of pregnancy complications. Research shows that high cortisol levels may reduce fertility and increase the risk of early pregnancy loss. At the same time, infertility itself can increase stress, creating a two-way relationship.

Research Gap

Most previous studies have focused on biological aspects of stress and fertility. However, little attention has been given to how individuals understand and experience stress and hormones in their daily lives. Research has mainly focused on women, while men's experiences are often ignored. There is also limited research in cultural contexts like Pakistan.

Significance of the Study

This study is important because it explores both psychological and biological aspects of fertility. It examines how people understand stress and cortisol and how these factors affect their reproductive experiences. It also considers lifestyle factors such as sleep, diet, exercise, and smoking.

Purpose of the Study

The purpose of this study is to explore the relationship between stress, cortisol, and fertility, and to understand how individuals interpret these factors in their lives.

Research Objectives

1. To understand how individuals experience stress during fertility issues.
2. To explore knowledge about cortisol and stress hormones.
3. To examine perceived links between stress and fertility.
4. To study awareness of lifestyle factors affecting reproductive health.
5. To analyze social and cultural beliefs about fertility.

Research Questions

1. How do individuals describe stress during fertility issues?
2. What is their knowledge about cortisol?
3. How do they link stress with fertility?
4. How do lifestyle factors affect reproductive health?
5. What cultural beliefs influence fertility?
6. How do individuals cope with stress related to fertility

Literature Review

Stress, Neuroendocrinology, and Reproductive Function

Fertility is influenced by both psychological and physiological factors. The hypothalamic-pituitary-gonadal (HPG) axis regulates reproductive hormones, including gonadotropin-releasing hormone (GnRH), luteinizing hormone (LH), and follicle-stimulating hormone

Policy Journal of Social Science Review
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Vol. 4 No. 3 (2026)

(FSH) (Odetayo et al., 2024; Zavala et al., 2020). Psychological stress activates the hypothalamic-pituitary-adrenal (HPA) axis, producing cortisol and corticotropin-releasing hormone (CRH), which can disrupt reproductive hormone regulation and impair fertility (Dwyer & Quinton, 2020). Elevated cortisol can inhibit GnRH neurons, reduce LH and FSH release, and disturb reproductive cycles, linking stress with fertility impairment (Odetayo et al., 2024; Zavala et al., 2020).

Physiology of Stress and Hormonal Regulation

Stress responses vary by duration and intensity. Acute stress triggers temporary HPA activation, increasing cortisol to support survival (Nunez et al., 2025; Russell & Lightman, 2020). Chronic stress leads to prolonged cortisol elevation, receptor desensitization, and immune dysregulation, disrupting homeostasis (Alotiby et al., 2024; Abdulrazzaq, 2023). Chronic HPA activation is associated with altered receptor sensitivity, increased adrenal size, and reduced ACTH response (Karin et al., 2020). Sex hormones modulate cortisol reactivity, contributing to individual differences in stress response (Arvidson et al., 2020).The concept of allostatic load illustrates the cumulative physiological cost of chronic stress. Prolonged HPA activation results in dysregulated cortisol rhythms and endocrine imbalance, affecting reproductive outcomes (Nunez et al., 2025; Rao & Androulakis, 2019; Patel et al., 2024). Cortisol dysregulation may manifest as hypersecretion or blunted patterns, depending on receptor sensitivity and chronicity (Mustafa & Hussein, 2025).

Cortisol as a Central Neuroendocrine Marker

Cortisol follows a circadian rhythm, peaking in the morning and declining throughout the day. Acute stress causes temporary increases, whereas chronic stress flattens diurnal patterns (Zavala et al., 2020; Volqvartz et al., 2023). Higher cumulative stress alters cortisol rhythms in both pregnant women and adults, showing sex-specific effects (Sherlock et al., 2024).Hair cortisol is a reliable indicator of long-term HPA activation, linked to lower fertility outcomes, including reduced IVF success rates (Marceau et al., 2020; Karunyam et al., 2023; Levis & Eid, 2025). Chronic stress affects reproductive parameters in both genders, including sperm motility and embryo quality (Sanchez et al., 2023; Theriol et al., 2020). Combining hair, serum, and salivary cortisol measurements enhances understanding of stress-related reproductive dysfunction.

Role of Cortisol in Pakistani Couples

Limited studies in Pakistan suggest that serum and hair cortisol may correlate with stress and unexplained infertility in women (Ali et al., 2021; Khan et al., 2022). However, research directly investigating cortisol as a predictive neuroendocrine marker among Pakistani married couples remains sparse, highlighting a critical local research gap.

Causes of Cortisol Elevation in Individuals Facing Fertility Concerns

Infertility itself is a significant psychological stressor, activating the HPA axis and elevating cortisol levels (Teklemicheal et al., 2022). Infertility-related stress is prevalent among individuals seeking fertility treatment, highlighting the need to consider both psychological and neuroendocrine factors.

Research Gap

Despite extensive studies linking stress, cortisol, and fertility, gaps remain. Most studies focus on single cortisol measurements or short-term stress, limiting understanding of chronic stress impacts. Few studies simultaneously assess psychological perception of stress and physiological cortisol responses in infertile populations, particularly among Pakistani couples, creating a knowledge gap in psycho-neuroendocrine correlations. Additionally, research on gender differences, timing of cortisol measurement relative to

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Vol. 4 No. 3 (2026)

reproductive cycles, and standardized methodologies is limited (Karunyam et al., 2023; Theriol et al., 2020). Addressing these gaps is critical for improving fertility interventions and developing integrated stress management strategies.

Methodology

Research Design

This study will adopt a qualitative phenomenological research design to explore the experiences and perceptions of Pakistani married couples regarding fertility and the role of stress and cortisol in reproductive health. Phenomenology is suitable to understand participants' lived experiences and personal meanings attached to infertility and stress.

Study Population

The target population includes married couples aged 20–40 years who are experiencing fertility challenges and seeking treatment at fertility clinics in Pakistan. Both men and women will be included to capture shared and gender-specific experiences of stress, reproductive health concerns, and coping strategies.

Sampling Strategy

A purposive sampling method will be used to recruit participants who can provide rich, relevant insights. The study aims to include 15 couples, sufficient for data saturation in qualitative studies. Efforts will be made to ensure diversity in socioeconomic status, duration of infertility, and geographic location.

Data Collection Methods

1. **In-depth Semi-Structured Interviews:**

- Couples will be interviewed separately to encourage open discussion.
- Interviews will focus on:
- Personal experiences with infertility.
- Perceived stress and emotional impact.
- Awareness or beliefs regarding physiological effects of stress (including cortisol) on fertility.
- Coping mechanisms and strategies used to manage stress during fertility treatment.

2. **Document Analysis (if applicable):**

Fertility treatment records and counseling notes may be reviewed to supplement interview data (while maintaining confidentiality).

Ethical Considerations

- Approval will be obtained from relevant **institutional ethical review boards**.
- **Informed consent** will be obtained from all participants.
- Confidentiality and anonymity will be strictly maintained. Participants can withdraw at any time without penalty.
- Psychological support will be offered if participants experience distress during interviews.

Data Analysis

- Interviews will be audio-recorded, transcribed verbatim, and translated into English (if conducted in Urdu).
- **Thematic analysis** will be conducted using Braun & Clarke's (2006) six-step framework:

1. Familiarization with data
2. Generating initial codes
3. Searching for themes
4. Reviewing themes
5. Defining and naming themes
6. Producing the report

- **NVivo** or manual coding may be used to organize and analyze qualitative data.

Policy Journal of Social Science Review
Online ISSN 3006-4635
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Vol. 4 No. 3 (2026)

- Reflexivity will be maintained to minimize researcher bias.

Results

The study explored infertility-related stress experiences among Pakistani men and women, through reflexive thematic analysis guided by Braun and Clarke's (2006) framework. Although the coding process was primarily inductive and data-driven, interpretation was guided by a neuroendocrine model of chronic stress activation and downstream reproductive functioning. Overall, participants did not consider infertility merely as a biomedical condition but rather as a prolonged psychosocial problem which is influenced by family hierarchies, gender norms, and economic circumstances. The themes that were identified illustrate both the psychological and physical aspects of suffering and, therefore, it is possible to assume the presence of a two-way stress and fertility feedback loop. Four overarching thematic domains were revealed in Table 2 and 3:

(1) Stress–Hormone–Fertility Cycle
(2) Gender Roles and Identity Pressure
(3) Social and Cultural Sources of Stress
(4) Marital Strains/Relationship Stress.

Both men and women experienced chronic stress, but their kind, degree, and physiological expression shifted in an extreme manner along gender dimensions.

Master Thematic Table with Codes

Table 2: ***Master table of Themes (Males)***

Main Theme	Subtheme	Initial Codes (In-Vivo)
Stress–Hormone–Fertility Cycle	Living with Constant Mental Pressure	"Mind never at rest"
		"Always thinking about money and future"
		"Cannot show what I feel inside"
		"Worry that never goes away"
	The Body Carrying the Burden	"Sleep never feels complete"
		"Lost interest in physical closeness"
		"Irritable for no reason"
		"Heart races, chest tightens, sweating"
		"Exhausted without doing anything"
		"Headache that stays"
	Knowing Stress is Hurting Fertility	"Stress is damaging my hormones"
		"This pressure is ruining my chances"
Gender Roles and Identity Pressure	Manhood Tied to Having Children	"Without a child I am not a real man"
		"I feel like I have failed"
		"Others look down at me now"

Policy Journal of Social Science Review
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Vol. 4 No. 3 (2026)

	Keeping Pain Hidden	مردوں کو کمزور نہیں ہونا چاہیے۔ "Men are not allowed to be weak" "I swallow everything and say nothing" "Pain comes out as headaches, not tears"
	Pressure From All Sides	"Constant questions about children" "Joint family watching everything"
Social and Cultural Sources of Stress	Forced Into Unregulated Treatment	"Hospital fees impossible to manage" "Went to hakim out of desperation" "Unregistered clinic, took the risk" "They promised results, nothing happened" "Spent everything, still nothing" "Stress got worse after each failure"
	Life at Home Suffering Too	"Marriage is not the same anymore" "Body and relationship both affected"
Marital Strains/Relationship Stress	Trapped Between Stress and Fertility	"Pressure is stopping it from happening" "Financial stress, treatment cost, no way out"

Table 3: ***Master Table of Themes (Females)***

Main Theme	Subtheme	Initial Codes (In-Vivo)
Stress and Fertility Caught in a Loop	Carrying Mental Pressure Every Day	"Crushed under mental pressure" "Crying alone, crying for hours" "What is wrong with me", "Why only me" "Fear that never leaves", "Always anxious" "Hide everything, show nothing"
	The Body Breaking Down	"Period comes and goes irregularly" "Two, three months with no period" "Pain that is hard to bear"

Policy Journal of Social Science Review
Online ISSN 3006-4635
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Vol. 4 No. 3 (2026)

		"Cannot fall asleep", "Sleep broken every night" "No desire to eat anything" "Weight kept increasing" "Stomach always unsettled" "Washing hands again and again", "Hours in the shower" "Cannot think clearly", "Forgetting simple things"
	Sensing That Worry is Blocking Pregnancy	"Hormones are not right", "Ovary has a cyst" "Stress is stopping the pregnancy" "Too much worry and it does not happen" "Happy feelings help the hormones"
Blamed for Everything, Worth Nothing	Always the Woman Who is Blamed	"Blame always comes to the woman" "They say nothing is wrong with their son" "Hear the same hurtful things every day"
	Feeling Worthless Inside	"Something must be wrong with me" "Feel completely worthless" "Lost all confidence in myself" "No hope left, no strength left"
	Falling Into Depression	"Darkness that feels unbearable" "Thoughts of going away, disappearing" "Do not want to talk, just stay in the room" "Angry all the time, cannot control it" "Had to see a psychologist", "Put on medication"
Social and Cultural Sources of Stress	Controlled and Mistreated by In-Laws	"Reminded about children every single day" "Always told I am the problem" "Was beaten" "Denied food", "No care when I needed it most" "Husband never stood by me" "Judged by everyone in the family"

Policy Journal of Social Science Review

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Print ISSN 3006-4627

Vol. 4 No. 3 (2026)

		"Society's expectations suffocate me"
	Pushed Toward Unregulated Treatment	"Could not afford the hospital"
		"Ended up at the hakim"
		"Went to unregistered clinics"
		"Tried illegal and unscientific places"
		"Nothing worked, no real solution"
		"Each failure left me more desperate"
Marital Strains/Relationship Stress	Relationship Slowly Damaged	"Marriage is not what it was"
		"Talk of divorce came up"
		"Reproductive health suffering too"
		"Husband was diagnosed with bipolar"

Figure 1: Core Themes and Sub-Themes

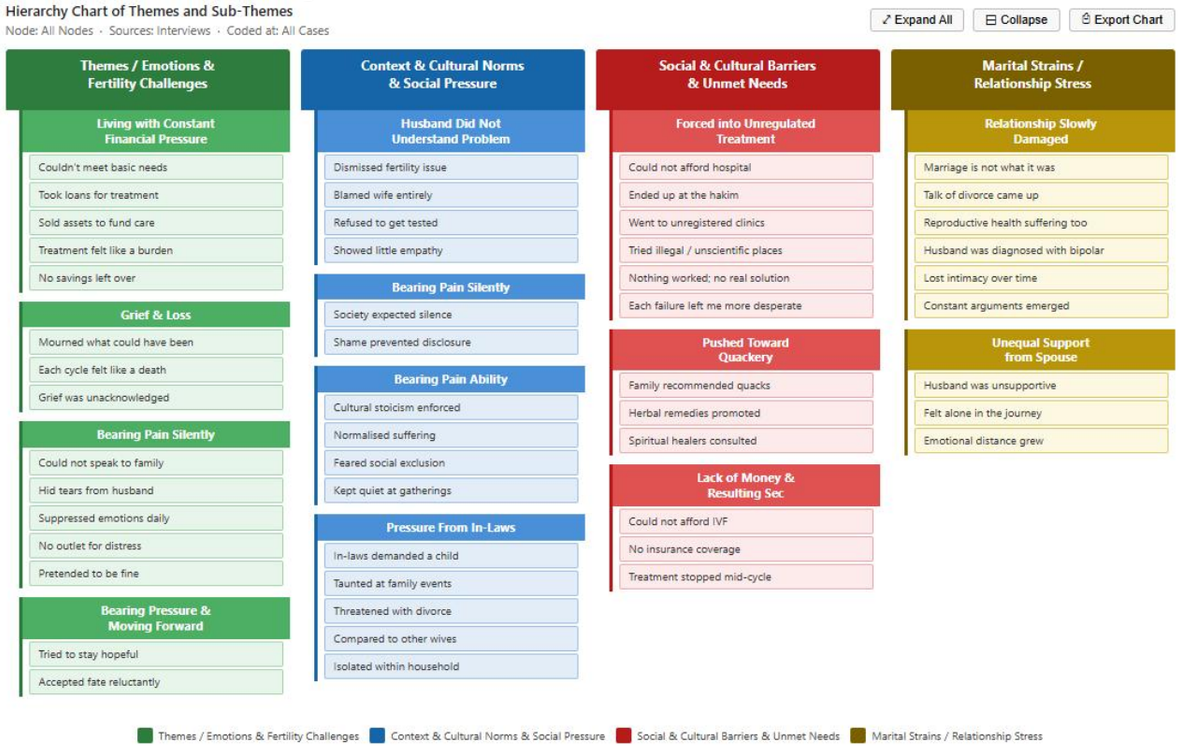

Figure 1. Hierarchy chart of themes from the qualitative analysis. Larger boxes represent more frequent references. Themes include sub-themes as nested nodes beneath.

Figure 2. World Pool

Policy Journal of Social Science Review

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Print ISSN 3006-4627

Vol. 4 No. 3 (2026)

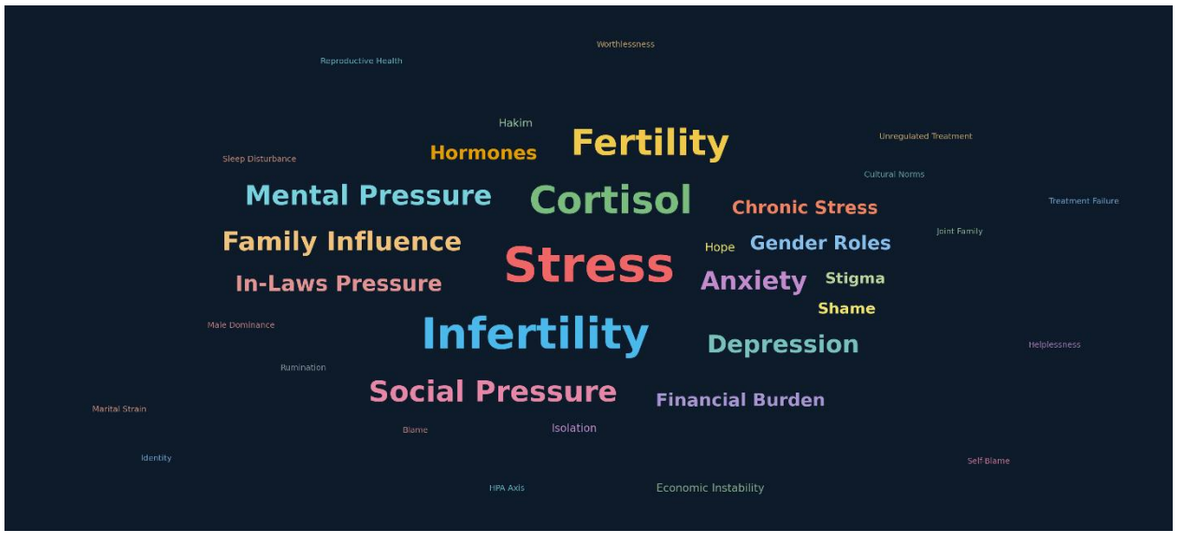
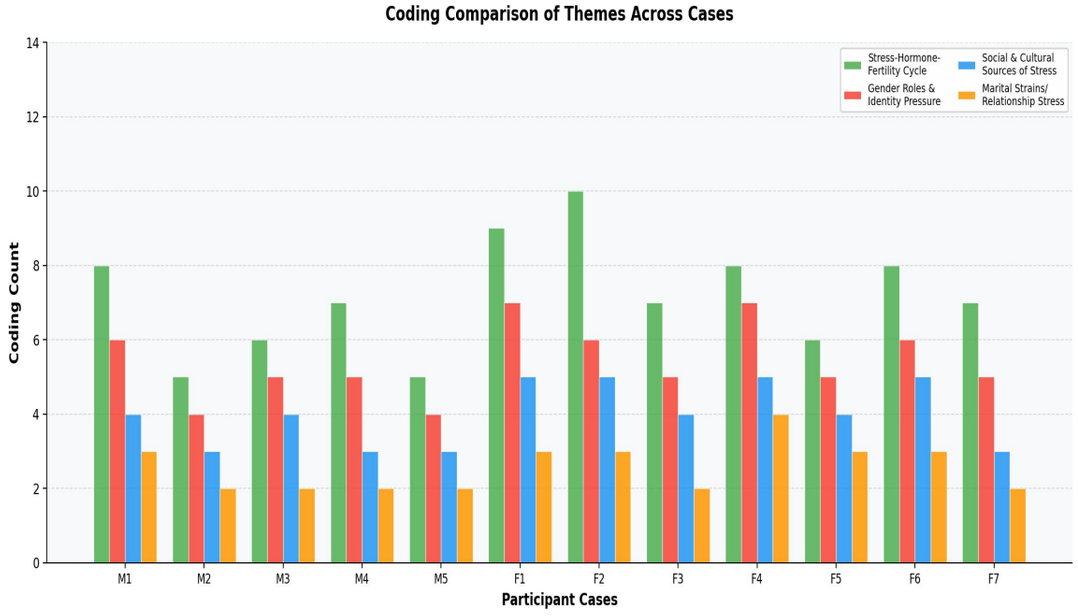


Figure 2. Key thematic words extracted from the qualitative analysis.

Figure 3. Coding Comparison of Themes Across Cases



Stress–Hormone–Fertility Cycle

Living with Constant Mental Pressure

This theme explored how infertile men and women in Pakistan absorbed long-term psychological stress as a persistent physical condition, making it more than simply a transient emotional response. via the use of participant narratives, it explored how stress was a chronic condition that was caused by a mix of financial difficulties, overanalyzing, and gendered ways of expressing emotions both directly and indirectly via behavior. Participants used the word *musalsal* (continuous/unremitting) to characterize the mental strain (*zehni dabao*) in various ways, thus highlighting that stress was always present and was not just an occasional reaction. In fact, *"tension"* refers to a situation which is so overloaded that nothing can be added, which is a statement mainly used by male participants. Males usually indicated this feeling by a mere change of expression while still

Policy Journal of Social Science Review
Online ISSN Print ISSN
3006-4635 3006-4627
Vol. 4 No. 3 (2026)

not showing any emotion externally; on the other hand, females divulged their "*troubles*" *(pareshani)* quite widely and even wept publicly. One female participant revealed:

ذ دبٹوؤلیقی کنجرررں اورامترروجھررں۔

I remain a victim of mental pressure and often keep crying. (F1)

The disparities in how men and women show stress vocally are consistent with societal norms around emotional expression, which imply that men and women are equally stressed but exhibit it in different ways. Financial difficulties proved to be a significant cause of stress, particularly for the males. The following demonstrates how the males consistently linked stress to the strain of providing and uncertainty about the future:

ولمستقیم تلمیذں منج دبٹوؤاور منج بٹورے کپوستکورں۔

I think about money pressure and the future all the time. (M1)

Infertility disrupts the culturally constructed male provider role in both reproductive and economic ways, and this is reflected in this study as well. Seeking unlicensed hakims and herbal medicine practitioners after going through expensive conventional medical treatments has brought about a new financial stress, in addition to the existing one. One of the male participants narrated that burden of anxiety:

"*My level of stress went up a lot when the treatments didn't work.*" *(M1)*

For instance, one of the most remarkable mental activities, especially among women, was brooding. On the other hand, men seemed to attribute their stress to external factors such as social obligations or financial problems. Some of the intrusive and persistent thoughts included:

میں خودسے پوچھتی رہتی ہوں کہ مجھ میں کیا خرابی ہے، یہ خیالات واپس آجاتے ہیں چاہے میں توجہ ہٹانے کی کوشش کروں۔

"I keep asking myself what's wrong with me, and the thoughts come back even when I try to focus on something else." (F2)

From the standpoint of neurobiology, such an incessant rumination could possibly be a mechanism through which the stress fertility cycle is perpetuated. It may do this by maintaining the HPA stress axis in an overactive state and thus producing cortisol for longer than usual.

The Body Carrying the Burden

This theme emphasizes on the physiological consequences of prolonged internal stress and the representation of neuroendocrine imbalance in the body. Those respondents who revealed their genders and described the pains or discomforts consistent with the extended activation of HPA axis, probably sleep issues, lack of sexual desire, changes in the menstrual cycle, and irregularities in the sympathetic nervous system, would have got these kinds of pains, as they have been described. The gender differences in these symptomatologies show the extent to which cultural narratives influence the symptoms of reproductive stress. Sleep disturbance was almost universal as eleven out of twelve respondents reported it.:

لیکھک تخفےری جھر۔

Sleep is always incomplete. (M1, F2, F4, M5)

Participants reported persistent mental and physical stimulation.

My mind keeps racing until morning; it just won't turn off. I am still exhausted and lying awake going over everything in my head. (M4)

Other participants even over time got used to such a break in sleep:

Policy Journal of Social Science Review
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Print ISSN 3006-4627
Vol. 4 No. 3 (2026)

This is now my life and I am used to being restless at night. (M2)
These narratives illustrate a condition of persistent dysregulation rather than sporadic sleeplessness. Gender disparities were evident in the topics of reproduction and sexuality. Male participants often associated stress with sexual difficulties. A participant disclosed:
Due to persistent stress, my sexual desire has diminished. (M1)
A different participant stated:
I feel as if my mind is blocked during sex. Stress has affected my sexual performance. (M4)
and
There is a constant feeling of pressure, like I have to prove something. (M5)
The male participants' stories went on:

جب نہیں ہوتا تو اندر سے مایوسی بڑھتی جاتی ہے۔

When it does not happen, frustration builds up inside. (M2)
Also

میں قربت سے بچتا ہوں کیونکہ یہ مجھے ناکامی یاد دلاتی ہے۔

I avoid closeness because it reminds me of failure. (M3)
Male participants' narratives seemed to merge the physiological effects of stress with the psychosocial aspects of masculinity. Among female participants, the most commonly reported physiological symptoms due to stress were menstrual irregularities and gynaecological changes:

میری ماہواری بالکل بے ترتیب ہو گئی۔ تناؤ تاخیر کی اصل وجہ تھا۔ کبھی کبھی مہینوں تک ماہواری نہیں آتی تھی۔

My period schedule became completely unpredictable. Stress was the main reason for late menstruation. Sometimes, it happened that I did not have my period for months. (F2)
The other female participant said:

ڈاکٹروں نے سمجھایا کہ تناؤ ہارمونز پر اثر ڈال سکتا ہے۔

Doctors explained that stress can affect hormones. (F3)

لگتا ہے جتنی زیادہ فکر ہوئی، ماہواری اتنی ہی بے ترتیب ہو گئی۔

It seems like the more anxiety I had, the less regular my cycle was. (F6)
In other excerpts, the theme of distress was strongly conveyed:

شروع میں میرا جسم عجیب طریقے سے رد عمل دینے لگا اور تناؤ نے سب سے پہلے میری صحت کو نقصان پہنچایا۔

At first, my system reacted unusually, and it was my health that got affected first by stress. (M1)
Participants also narrated general autonomic and metabolic symptoms. Several male respondents shared experiences of cardiovascular and hyperarousal-related symptoms:

اچانک تیز دھڑکن، سینے میں جکڑن، بغیر محنت کے پسینہ اور اندر سے مسلسل کشیدگی۔

Sudden rapid heartbeat, tightness in my chest, sweating without exertion, and a constant sense of internal tension. (M3)
Female respondents primarily reported changing appetite and gastrointestinal symptoms:

کھانے کا دل نہ کرتا تھا؛ پیٹ تقریباً ہر روز خراب رہتا۔ پریشانی بڑھتی تو طبیعت خراب ہو جاتی اور بغیر محنت کے بہت تھکاوٹ ہوتی۔

I did not want to eat; my stomach was upset almost every day. I would feel sick when anxiety got higher, and I was very tired even if I had not done any physical work. (F4)
Several narratives disclosed a deep level of exhaustion:

Policy Journal of Social Science Review
Online ISSN 3006-4635
Print ISSN 3006-4627
Vol. 4 No. 3 (2026)

جسم بہت بھاری لگتا ہے اور واقعی کبھی سکون نہیں ملتا۔

My body is very heavy, and I never really get any rest. (F1)

One participant related compulsive washing behaviors under severe stress:

میں بار بار ہاتھ دھوتا رہتا ہوں؛ گھنٹوں غسل خانے میں گزار سکتا ہوں۔ مجھے پتہ تھا زیادتی کر رہا ہوں لیکن رک نہیں پاتا تھا۔

I keep washing my hands; I can spend a whole time in the shower. I was well aware I was overdoing it, but I just could not stop. (M12)

These portrayals are consistent with high, potentially pathological anxiety and may be accompanied by obsessive-compulsive symptoms. Importantly, such episodes were reported within contexts of extreme stress, including severe familial conflict and interpersonal antagonism.

Knowing Stress is Hurting Fertility

This theme examines a particular contradiction that the participants disclosed: they are structurally unable to break the loop of stress's detrimental effects on fertility, despite their awareness of this fact. It might be referred to as folk neuroendocrinology, or embodied knowledge acquired through life experience rather than formal medical education, since some participants exhibited a tacit awareness of physiological stress, hormone, and reproductive systems. Most significantly, however, this knowledge did not empower people to take action; rather, it often made their suffering worse by making them bear even more burdens in their life as a result of self-monitoring in already stressful and chaotic situations. Some respondents demonstrated awareness of how stress can influence hormonal regulation and fertility. Two male respondents noted:

مجھے لگتا ہے کہ میرے جسم کے ہارمونز مسلسل تناؤ سے متاثر ہیں، جو میری پیدائشی صلاحیت اور مستقبل کو نقصان پہنچا رہا ہے۔

I think that my body hormones are under the influence of constant stress, which is affecting my ability to procreate and my future. (M3)

Also other male participants responded that

یہ مسلسل ذہنی دباؤ میرے ہارمونز اور میرے مستقبل کو متاثر کر رہا ہے۔

This constant mental pressure is affecting my hormones and my future. (M5)

These descriptions align with elevated anxiety, perhaps pathological, and it is plausible that obsessive-compulsive symptoms may also be evident. These episodes, deemed critical, reportedly occurred at times of intense stress, including significant familial problems and interpersonal hostility.

جب بھی تناؤ ہوتا ہے، علامات ہمیشہ ایک ہی طریقے سے ظاہر ہوتی ہیں۔

Whenever I get tense, my symptoms usually run the same pattern. (F3)

Another big theme was the paradox of awareness and helplessness. A woman participant said that she was only partially aware of the fact that she should not be too concerned about pregnancy:

اگر بہت زیادہ فکر کروں تو یقیناً حمل پر اثر پڑے گا، لیکن کیا کروں؟ اپنے خیالات بھی نہیں روک سکتی۔

If I worry a lot, it will certainly have an impact (pregnancy), but what can I do? I can't even stop my thoughts. (F7)

In a similar vein, another participant remarked:

گھر والے کہتے ہیں پریشان نہ ہو، لیکن جب روز نیا سوال ہو کہ 'خوشخبری کب آئے گی؟' تو دماغ بوجھل ہو جاتا ہے۔

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Vol. 4 No. 3 (2026)

My family members tell me not to get stressed, but when there is a new question every day like 'When will the good news come?', my brain gets overloaded. (F2)

It is thus observed that awareness of the negative effects of stress does not necessarily imply the capacity to manage it. Indeed, awareness only served to heighten anxiety levels, as participants recognized the burden placed upon them to regulate their stress while stressors themselves financial difficulties, family pressures, and relationship issues remained largely unchanged. One male participant encapsulated this situation:

ڈاکٹر نے بھی تناؤ کم کرنے کا مشورہ دیا، لیکن جب علاج کے اخراجات بڑھتے جا رہے ہوں اور لوگ باتیں کریں تو تناؤ کیسے کم ہو؟

The doctor also advised me to reduce my stress levels, but how can one reduce stress levels when treatment costs are continually mounting, coupled with people commenting on you? (M1)

These findings highlight the importance of moving beyond informational support to substantive emotional and structural support, without which meaningful changes to emotional states cannot be facilitated.

Gender Roles and Identity Pressure

Manhood Tied to Having Children

This theme explores how infertility was a major threat to the masculinity of male participants. It triggered a specific type of social stress that was linked to cultural ideas of manhood and the power to have children. In Pakistani culture, where becoming a father is almost equivalent to being a man, hence it is the status and social worth of a man, not being able to have children is more than a medical condition, it is a failure of gender identity. The pain is even greater because the culture does not allow the expression of emotions, and therefore men had to hide their suffering instead of relieving it. This probably heightened and prolonged the neuroendocrine stress responses. This was the gist of the following:

طبیعت دمشعلہ راا قشی کمپی وع متنبّی د ممیّز رے کمپی ے دمکٹا تحقیق ن بسیں ں کا جھر۔

I started to think of myself as a loser because in our society, a man is a man through children. (M2)

Such a story invokes an inherent social belief that associates manhood with the ability to procreate. Another male respondent shared a similar experience:

طبیعت دمشعلہ دو فتنے وں کا مستثنیاس متنبّی کمپی وع متنبّی د۔

I started to feel less than others. (M5)

Besides, this statement shows that childlessness was associated with a sense of social shame. Infertility thus became an identity threat that was externally shaped by the societal conception of manhood. How participants dealt with their anguish was equally important. One male participant said:

I do not reveal my feelings because a man with a weakness is considered to be going against nature. (M3)

The quote reflects how gender roles serve as tools for emotional regulation. The idea of vulnerability being unfitting to masculinity was one of the reasons why participants did not open up about their feelings or seek help. They reported that they hid their suffering; this behaviour may be a source of their prolonged psychological distress. Male participants' stories pointed to psychological trauma being hardly ever disclosed as depression but rather through emotional repression and conversion into anger and physical symptoms:

Policy Journal of Social Science Review
Online ISSN 3006-4635
Print ISSN 3006-4627
Vol. 4 No. 3 (2026)

اکثر چھوٹی چھوٹی باتوں پر غصہ اور چڑچڑا پن آتا ہے۔

I am frequently angry and irritated about little things (M4)
also

چھوٹی باتوں پر غصہ آجاتا ہے؛ خود پر قابو نہیں رہتا۔

I get angry at small things; I lose control of myself. (M1)
These statements reveal that the tension is beyond control, rather than being recognized as sadness. Moreover, the presence of culturally shaped norms that guide male suffering into anger as an acceptable expression of the opposite sex is indicated. Men did not consider themselves depressed even when they were under very stressful situations and unhappy for a long time. This is a big difference from women's accounts where depression was openly discussed. Most probably this shows different ways of expressing emotions rather than there being no symptoms of depression. The connection of psychological pressure, somatic feeling, and social relations was also reflected:
"Stress has negatively impacted my relationship with my wife."

Blamed for Everything, Worth Nothing

This theme explores the experiences of the female participants who suffered from a very peculiar and extremely severe type of reproductive stress. It was so deeply rooted in the society that women were blamed for infertility even when the medical diagnosis showed otherwise. These women, who were part of patriarchal family systems that never ceased to devalue their reproductive worth, carried the feelings of inadequacy and worthlessness beyond the mere realities of their physical conditions. The consequent psychological burden, which came along with self-blame, societal guilt, physical aggression, and in some cases, clinical depression, constitutes a gendered escalation of the neuroendocrine stress normally linked to infertility. One of the most remarkable elements of their behaviour was incessantly asking themselves questions and blaming themselves:

ممیّں؟

Why am I the only one? (F1)
One female participant expressed:

امتر مستحصر وری اور پنیڑ بکنی س جھر اور طیسیت دمشعلہ بٹو ئتر پنیڑ لیقی رس مکھو۔

I often feel weak and helpless and I felt completely worthless. (F4)
Another women explained:
Despite everything being normal, I felt the deficiency was in me. (F5)
Notably, women engaged in self-blame even when medical evaluations were normal or when male-factor infertility had been diagnosed. One respondent stated:

رتخفے رچپنے ں واگبو گنجڑ ریپنگ دمشمو نٹھل مشغلواس، تشنہ پٹیتی انیکتاام پینگ آ۔

The reports clearly showed the problem was in him, yet the blame still came to me. (F7)
This demonstrates that women's mental suffering was determined to a large extent by social and cultural expectations rather than biomedical realities. The development of self-blame was also strongly linked to patriarchal family structures. One participant, herself a psychologist, articulated the structural pattern:
Although it might be in the husband, it is the woman who is always held accountable. (F7)
In her case, despite her husband's documented azoospermia, her mother-in-law continued to attribute infertility to her daughter-in-law. This participant reported repeated attempts to seek separation:

میں نے کئی بار شوہر سے کہا کہ طلاق لے لیں،انہوں نے انکار کیا۔

I told my husband many times that we should divorce, and he said no. (F7)

This placed her in the position of remaining in a relationship where she was medically scapegoated despite clear diagnostic evidence. Another woman echoed similar familial pressure:

ہر موقع پر کہتے: 'تمہاری وجہ سے یہ گھر ادھورا ہے۔'

At every instance they would say, 'because of you this home is incomplete.' (F6)

Women's testimonies revealed the gravity of the psychosocial effects they faced, including experiences of violence. One participant shared:

جب میں نے ساس کو شوہر کی تشخیص بتائی تو انہوں نے مجھ پر جسمانی حملہ کیا۔دھکا دیا اور کہا کہ ایسی باتیں کبھی نہ کروں۔

When I informed my mother-in-law about my husband's diagnosis, she physically attacked me. She pushed me and ordered me to never mention such things. (F6)

These accounts illustrate how disclosure of male-factor infertility resulted in silencing and victim-blame. Psychologically, three of the seven women exhibited symptoms consistent with major depression:

لگتا تھا کہیں دور چلی جاؤں یا مر جاؤں،دن رات گھنٹوں روتی رہتی تھی۔

I felt like going far away or even dying, and I cried day and night, for hours. (F4)

Another woman echoed similar pattern:

نیند بالکل ختم ہو گئی؛رات بھر سوچتی رہتی تھی۔

My sleep had completely disappeared; I kept thinking all night. (F2)

Their distress resulted in impaired daily functioning across multiple domains, including cognitive difficulties *("My ability to think clearly reduced; I would forget simple things"), social withdrawal ("I confined myself to one room"), and formal psychiatric help-seeking ("I went to a psychologist and was given prescriptions*"). Participants also linked their mental distress to physical health:

چھیتیا جکڑ ؤ بقچیو جمگھٹے اری پنیٹر ٹکسلا جھک نٹو۔

When my stress level went up, my period stopped being regular. (F3)

The findings collectively highlight the intersection of infertility, self-blame, and cultural strain, as one participant's account most poignantly conveyed:

پنجر ری ککازدہ ینگر میسی ں منتج روجنہ د۔

More than the condition, people's attitudes exhausted me. (F6)

Keeping Pain Hidden

Stress manifestations differed systematically across genders. Among men, distress was characterized by somatization, sexual dysfunction, irritability, and cardiovascular complaints, alongside external emotional control:

ہر وقت کشیدگی رہتی ہے لیکن محسوس نہیں ہوتی؛ نیند نہ آنا اور سر درد کی صورت میں ظاہر ہوتی ہے۔

I am tense all the time, but I do not notice it; it manifests itself as sleeplessness and headaches. (M4)

Another man echoed:

اندر مسلسل گھٹن ہے لیکن زیادہ اظہار نہیں کرتا۔

There is constant suffocation inside, but I do not express it much. (M3)

Policy Journal of Social Science Review
Online ISSN 3006-4635
Print ISSN 3006-4627
Vol. 4 No. 3 (2026)

By contrast, women demonstrated heightened emotional expression, internalized cognitive patterns, and a greater frequency of mental health diagnoses:

روتی رہتی ہوں اور خود سے سوچتی رہتی ہوں؛ لگتا ہے مسئلہ میں ہوں۔

I cry and keep thinking to myself; I feel that I am the problem. (F1)

Another woman expressed the same thing:

ہر بات دل پر بوجھ ڈال دیتی ہے؛ رو کر خود کو قصوروار ٹھہراتی ہوں۔

Every matter weighs on my mind; I end up crying and blaming myself. (F5)

These patterns may be interpreted within culturally embedded norms governing emotional regulation: men are expected to contain affect, often resulting in somatic expressions of stress, whereas women may express sadness but simultaneously internalize blame. A male participant articulated this constraint directly:

مرد کو مضبوط رہنا پڑتا ہے ورنہ لوگ کمزور سمجھتے ہیں۔

A man has to remain strong; otherwise people consider him weak. (M2)

Conversely, a woman described the emotional burden of social expectations:

سوال ہمیشہ عورت پر اٹھتے ہیں، اس لیے دل اور دماغ دونوں تھک جاتے ہیں۔

Questions are always raised about the woman, so both heart and mind become exhausted. (F2)

These observations were corroborated by biological markers. Menstrual irregularities were reported by all female participants, while a substantial proportion of men described sexual dysfunction. One woman explained:

جب تناؤ بڑھتا ہے تو ماہواری بے ترتیب ہو جاتی ہے۔

When stress increases, my cycle becomes irregular. (F3)

A male respondent similarly linked stress with sexual health:

تناؤ نے میری کارکردگی کو متاثر کیا ہے۔

Stress has affected my performance. (M4)

Social and Cultural Sources of Stress

Pressure from All Sides

In this theme, the individual's nearest social circle, especially the extended family and the hierarchy of in-laws, was a major source of stress that kept on adding to the psychological distress caused by infertility. The people told of being watched and hunted for reproductive signs, interrogated and maltreated, which socially endangered them again and again. The relatives kept asking the couples for children, thus the couples felt that they were constantly socially judged and evaluated:

ینگر میں لیقی تخفے سنگجر بھینٹی ٹیکہہ دہ ئق مشغلو بطا لیقین ں نجو۔

I found it very unpleasant the way people ask me when I am going to have kids. (M5)

and

The repeated questions are making me psychologically ill; it feels like I am constantly being judged. (M2)

and

جب بھی کوئی اجتماع ہو، صرف ایک سوال ہوتا ہے: 'کوئی خوشخبری؟'

Whenever there is a gathering, the only question is 'any good news?' (F2)

Policy Journal of Social Science Review
Online ISSN 3006-4635
Print ISSN 3006-4627
Vol. 4 No. 3 (2026)

جب لوگ مذاق میں بھی کہتے ہیں 'ابھی تک کچھ نہیں؟' تو گہری تکلیف ہوتی ہے۔

Even when people say jokingly 'still nothing yet?' it affects me deeply. (M1)

These testimonies show that reproductive interrogation was more than a simple nuisance, it was an emotionally threatening experience for both genders. Women perceived pressure from in-laws as a main means of control, neglect, and abuse. One participant narrated systematic deprivation

مجھے کھانا بھی ٹھیک سے نہیں دیا گیا، دیکھ بھال نہیں کی گئی، کمزوری کے وقت بھی سہارا نہیں ملا۔

I was not given enough food, not cared for, or supported even when I was most vulnerable. (F6)

Another participant narrated continuous verbal abuse:

سسرال میں کہتے: پہلے بچہ پیدا کرو پھر عزت ملے گی۔

At my in-laws' place, they would say, make the first baby and then you will get respect. (F5)

This participant was also physically beaten after mentioning her husband's infertility, illustrating how patriarchal family structures maintain the concealment of male-factor infertility through violence. Women also experienced a lack of spousal support:

میرا ساتھ دینے کی بجائے میرے شوہر ہمیشہ خاندان کا ساتھ دیتے، میری رائے کوئی اہمیت نہیں رکھتی تھی۔

In addition to not favouring me, my husband was more family-oriented and usually sided with his mother, so my opinion was worthless. (F4)

Joint family structures exacerbated women's suffering by restricting privacy and enabling community observation of reproductive capacity:

گھر پر ہر وقت نظر رکھی جاتی تھی، لگتا تھا اپنی زندگی پر کوئی اختیار نہیں۔

My house was constantly watched, and I did not feel like I had any control over my life. (F3)

Forced Into Unregulated Treatment

This theme illustrates how the participants of the study, being unable to pay for professional reproductive care, were pushed into a treatment market with no regulation, full of promises that dont get fulfilled, repeated failures, and a level of psychological trauma that is getting worse. Their search for cheap, low-cost alternatives led them to unlicensed clinics, herbal medicines, and traditional healers, and through this they constructed a cycle of stress amplification where each failure effort resulted in an increase of anxiety to even higher levels instead of just the initial level. One of the participants said:

جب فیسیں، دوائیں اور بار بار کے ٹیسٹوں کا خرچ بڑھتا گیا تو ہم نے متبادل راستہ اپنایا۔

When the fees, medicines, and cost of repeated tests piled up, we couldn't take it anymore, so we went for an alternative. (M1)

Another participant said:

ہر بار نئے ٹیسٹ اور نئی دوائیں بتاتے؛ بل ہمارے بس سے باہر ہو گئے۔

Every time we went there, they would recommend new tests and new medications; the bills got out of our hands. (M2)

As a result, both men and women admitted visiting unregistered clinics, traditional healers *(Hakims),* and using non-scientific methods of treatment:

سستے داموں کی وجہ سے ہمیں جڑی بوٹیوں اور چھوٹے پرائیویٹ کلینکوں کی طرف راغب کیا گیا۔

Because of the cheaper prices, we were convinced to try herbal medicine and private small clinics. (F4)

Policy Journal of Social Science Review
Online ISSN 3006-4635
Print ISSN 3006-4627
Vol. 4 No. 3 (2026)

The male and female accounts mirrored each other in portraying the pressure emerging from a lack of choice and economic desperation. As one female participant recollected,

ہمیں معلوم تھا وہ مکمل قابل اعتماد نہیں، لیکن کوئی اور چارہ نہیں تھا۔

We knew that they were not completely trustworthy, but we had no other option. (M5)

while a male participant noted that

مجبوراً مجھے بھی روایتی علاج آزمانا پڑا۔

By force, I also tried traditional medicine (M3).

Another female participant summarized how exhausting the search for affordability was:

ہر جگہ گئے، سستے علاج کی تلاش جاری رہی۔

Going everywhere, we kept on looking for cheaper options (F1).

A co-theme was the extensive use of informal fertility care; ten out of twelve participants reported at least one unregulated method. The change was felt as forced rather than chosen, as one male participant frankly voiced:

ہمارے پاس کوئی اختیار نہیں تھا؛ یہی ایک راستہ بچا تھا۔

We did not have a choice; it was a only thing we were left with (M4).

By making attractive promises and giving unachievable deadlines, providers deceived participants who were in despair once again. One male participant remembered being told:

ڈاکٹر نے یقین دلایا کہ چند مہینوں میں سب ٹھیک ہو جائے گا۔

The doctor assured us that everything would be fine within months (M1)

and another participant recalled the statements that:

انہوں نے کہا: آپ کو سو فیصد نتیجہ ملے گا۔

They told us, you will get a 100 percent result (M2).

The subsequent deep emotional involvement made the failure extremely painful. One female participant was thinking out loud:

ہم نے اتنا جذباتی لگاؤ لگایا کہ واقعی یقین تھا اس بار ہو جائے گا، لیکن نہیں ہوا۔

We emotionally invested so much that we really thought it would work this time, but it did not (F2),

and a second one told:

ہر ناکام کوشش جیسے نئے سرے سے شروع کرنا ہو۔

Each unsuccessful try was like starting over again (F4).

Participants also highlighted the overall loss of hope that came with each treatment episode. One male participant said:

ہر ناکامی امید کا تھوڑا اور حصہ توڑ دیتی۔

Each failure shattered a little more hope (M3)

and another said:

ہم کوشش جاری رکھے کیونکہ رکنا زندگی سے ہار ماننے جیسا لگتا تھا۔

We kept trying because stopping felt like giving up on life (M5).

Trust was also eroded gradually:

ہر دھچکے کے بعد کسی پر بھروسہ کرنا مشکل ہوتا گیا۔

After every setback, it became harder to believe anyone (M1).

Policy Journal of Social Science Review
Online ISSN 3006-4635
Print ISSN 3006-4627
Vol. 4 No. 3 (2026)

Beyond the financial dimension, one participant emphasized that

جذباتی تھکاوٹ مالی نقصان سے بھی زیادہ بری تھی۔

"The emotional exhaustion was worse than the financial loss" (F5)

reframing treatment failure not merely as economic depletion but as sustained psychological attrition. This pattern was reinforced by the intensifying nature of each subsequent disappointment:

ہر بار علاج ناکام ہوتا تو پچھلی بار سے زیادہ تکلیف ہوتی۔

"Every time a treatment failed, it hurt more than the last one" (M4)

with another describing how

یہ مایوسیاں ہمیں مالی اور جذباتی طور پر نچوڑ رہی تھیں۔

"The let-downs were draining us financially and emotionally (M2).

Together, these narratives reveal a pattern of repeated disappointments, soaring hopes, and very few choices that slowly built up mental stress. Especially it was seen that instead of restoring individuals to their original state, treatment failure increased their misery which was a reverse situation in a way that treatment for infertility led to an increase of stress that ironically is also the factor believed to negatively impact fertility.

Summary

This chapter integrates the participants' stories to reveal that infertility is not simply a medical issue but also a long, term and deeply ingrained stress experience. The study reveals that mental suffering is continuously generated through one's personal evaluations, physiological reactions, and socially influenced pressures, with the emotionally distressed patterns reflecting culturally diverse modes of emotional expression and regulation. The findings highlight how the fertility problems become interwoven with one's identity, the security of relationships, and the feeling of being appreciated by one's social network, and thus the risk of chronic stress gets amplified. An essential aspect is that stress was not only depicted as a consequence but also as a state that was believed to affect the functioning of the body and the treatment procedures, thus suggesting a stress health reciprocal dynamic. Concurrently, different narrative styles reveal how deeply gender roles and family structures influence the individual's psychological reactions, the modes of communication, and management strategies. The hurdles of the limited budget and the care-seeking pathways have surfaced as two major aspects that modulate emotional distress and the overall enduring of hope.

Conclusion

This research emphasizes the fact that the association between psychological stress and infertility is complex, bidirectional, and very much rooted in the sociocultural context of Pakistan. When analyzed from a neuroendocrine perspective of stress, the narratives of the participants indicate that chronic psychological stress, influenced by stigma, gender roles, family obligations, and economic difficulties, could be a contributing factor to the activation of the HPA axis. It is essential to note that cortisol, in this research, is not a direct biomarker but a theoretical construct that represents the biological embedding of chronic stress. The participants' experiences of sleep disturbances, menstrual problems, sexual dysfunction, rumination, and emotional exhaustion are consistent with patterns identified in the chronic stress physiology literature. The results also show that infertility is more than a biomedical condition, as it is a stress experience mediated by the social environment. Women were more likely to experience blame, surveillance, and identity loss,

while men reported stressors related to provider roles, masculinity, and economic strain. These gendered stress processes, while different, are intertwined within marital and family systems, creating a stress–infertility feedback loop. In conclusion, the importance of biocultural approaches to infertility that consider psychological, physiological, relational, and structural factors is highlighted.

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