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Association between grade 3 and 4 pelvic organ prolaps and anxiety based on cortisol levels

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Abstract

Introduction: Higher degrees of Pelvic organ prolapse (POP) (grades 3 and 4) are often associated with anxiety, which can reduce quality of life. The aim of this study was to determine the association between grades 3 and 4 pelvic organ prolapse and anxiety symptoms, as assessed by serum cortisol levels.

Material and methods: A cross-sectional study involved women diagnosed with grade 3 or 4 POP; it was conducted at Dr. Wahidin Sudirohusodo General Hospital and other teaching hospitals from January to December 2023. Anxiety levels were assessed using the Hamilton Anxiety Rating Scale (HARS) questionnaire, and blood cortisol samples were collected to evaluate physiological stress. The correlation between POP severity and cortisol levels was analyzed using Statistical Package for the Social Sciences (SPSS) version 27.

Results: This study consisted of 97 individuals (48 in the anxiety group and 49 in the non-anxiety group). Preliminary findings showed that patients with grade 4 POP showed significantly higher anxiety scores (41 subjects vs. 11 subjects) and higher cortisol levels (21.96±18.31 vs. 15.81±12.12) compared to patients with grade 3 POP. A positive correlation was found between the degree of POP and cortisol concentrations ($p<0.05$), indicating a potential psychophysiological impact of prolapse severity.

Conclusion: There is a significant association between the severity of pelvic organ prolapse and anxiety symptoms, as evidenced by elevated cortisol levels. A holistic approach to POP management, encompassing both physical and psychological aspects of patient care, is essential.

Key words: Pelvic organ prolaps, anxiety, cortisol levels

Introduction

For women who are multiparous, pelvic organ prolapse (POP) is a prevalent condition. From 3% to 50%, the prevalence of POP varies greatly[1]. According to reports, the frequency of POP in low-income nations ranges from 2.9% to 41.1% worldwide[2]. There is an Oxford Grading scale used for measuring strength, graded from 0 to 5. Grade 0 is indicated for cognition without a pelvic floor[3]. Grade 3 POP occurs

when the pressure is sufficient with a certain lifting force (where the contraction can be felt moving upwards) and grade 4 occurs when the pressure is good, with good lifting force (the contraction must be able to be repeated several times)[4].

Anxiety symptoms have been reported in approximately 20% of postmenopausal women with POP. Long et al. (2021) reported that patients with severe POP had symptoms of anxiety and depression before surgery[1]. The severity of anxiety was found to be strongly correlated with the severity of pelvic floor dysfunction[5]. Previous research reported a significant relationship between anxiety scores and serum cortisol levels[6]. Anxiety symptoms are associated with an exaggerated cortisol response[7].

Survival depends on a person's capacity to react swiftly and adaptably to stresses and dangers in the environment. To help the body react to external demands, metabolic and immunological characteristics are influenced by interactive physiological responses involving the autonomic nervous system and the hypothalamic-pituitary-adrenal (HPA) axis. Allostasis is the process by which these alterations lead to stability. A key factor in maintaining homeostasis is cortisol, which also mediates and inhibits normal stress reactions. Chronic exposure to glucocorticoids, however, can alter the structure of parts of the brain (such as the hippocampus) that control the stress response and have a role in the pathophysiology of anxiety disorders[7].

The role of cortisol in anxiety related to POP makes it a potential biomarker of anxiety in POP. Identifying biomarkers of anxiety in POP could facilitate the prediction of anxiety, allowing for prompt management of anxiety to optimize POP management. Thus, the purpose of this study was to investigate, using cortisol levels, the association between anxiety and grade 3 and 4 pelvic organ prolapse (POP).

Materials and Methods

Study Design

This study uses a cross-sectional methodology and is analytical in nature. The study was carried out in Dr. Wahidin Sudirohusodo General Hospital, numerous teaching hospitals in the Obstetrics and Gynecology department of Hasanuddin University, and other networking hospitals In January 2023 – December 2023

Study Subjects and Protocol

The study subjects included postmenopausal women diagnosed with grade 3 or 4 pelvic organ prolapse and who agreed to participate by signing an informed consent. Women with a history of mental disorders, anxiety prior to POP diagnosis, use of medications such as antihypertensives, glucosteroids, and antibiotics, and those undergoing hormone replacement therapy were excluded.

Each subject was asked to complete the Hamilton Anxiety Rating Scale (HARS) questionnaire, which measures anxiety levels. Anxiety is defined by subjects having a HARS score of more than 1. Venous blood samples were also drawn from all subjects to measure blood cortisol, which is used to assess physiological stress. Cortisol levels were measured using the ELISA method.

Ethical Clearance

This research was conducted based on the approval of Ethical Clearance from the Biomedical Research Ethics Commission at the Faculty of Medicine, Hasanuddin University, Makassar with Ethics Number 119/UN4.6.5.31/PP36/2025. Research approval has been given in the form of written informed consent. Subjects or prospective research subjects have been given an explanation of the purpose, benefits, procedures of the research, not to cause harm to the research subjects, the identity of the research subjects has been kept confidential and will not be published without the permission of the research subjects. Informed consent was obtained before data collection, patients have the right to refuse to participate in the research.

Statistical Analysis

The Statistical Package for the Social Sciences (SPSS) of International Business Machines (IBM, version 27.0) was used to analyze the data. Subject characteristics (age, education, occupation, parity, BMI, duration of menopause) are displayed as frequencies and percentages. To determine the differences in characteristics between the groups of subjects with and without anxiety, a chi-square test was used. The relationship between pelvic organ prolapse and anxiety was used. The relationship between pelvic organ prolapse and cortisol levels was used using the Mann-Whitney test because the cortisol level variable had a non-normal distribution based on the Shapiro-Wilk test ($p<0.05$). The confidence level of this study is 95%, with a p-value <0.05 being considered significant.

Results

This study was carried out at Wahidin Sudirohusodo General Hospital and the Education Networking Hospitals of the Department of Obstetrics and Gynecology, Faculty of Medicine, Hasanuddin University, on menopausal women who were diagnosed with grade 3 and 4 uterine prolapse within a year. Ninety-sevel menopausal women with grade 3 and grade 4 uterine prolapse made up the study's sample; 48 were in the anxiety group and 49 were in the non-anxiety group as controls. Age, education, employment, parity, BMI, contraception, and menopausal duration were among the characteristics of the research participants that were discovered. Table 1 shows a comparison of the characteristics of research participants between the group experiencing anxiety and the group non-anxiety.

According to age, the majority of women in the anxiety group were between the ages of 55 and 59, whereas the majority of women in the anxiety group were between the ages of 50 and 54. Age-wise, there was a significant difference ($p<0.05$) between the two groups. The majority of the research participants had completed high school, and there was no discernible difference in the two groups' educational backgrounds between the women with and non-anxiety groups ($p>0.05$). According to occupation, the majority of research participants were jobless in both the anxiety-affected and anxiety-free groups, and there was no discernible difference between the two groups ($p > 0.05$).

Both the anxiety group and non-anxiety group of women were primarily multiparous, however there was a significant difference between them based on parity ($p<0.05$). The BMIs of the women in the anxiety group and non-anxiety group groups were largely normal, and there was no discernible difference between them ($p>0.05$). The majority of the menopause in the group of women with anxiety happened within 5–10 years, whereas the majority of the menopause in the group of women non-anxiety happened within <5 years. The two groups differed significantly in terms of menopause duration ($p < 0.05$).

According to the comparative test findings, grade 3 and grade 4 prolapse differed significantly in terms of anxiety levels, where it was found that grade 4 uterine prolapse experienced a higher level of anxiety than Grade 3 ($p<0.001$) (Table 2).

Table 3 shows that postmenopausal women with grade 4 uterine prolapse had higher serum cortisol levels with an average of 21.96 ± 18.31 compared to women with grade 3 uterine prolapse with an average of 15.81 ± 12.12. Cortisol levels in individuals with grade 3 and grade 4 prolapse do not differ statistically significantly, as indicated by the p value > 0.05.

Discussion

Physiologically and psychosocially, the physical symptoms of POP, such as vaginal protrusion, pelvic pain, sexual dysfunction, and bowel and bladder disorders, significantly disrupt daily activities and interpersonal relationships. These symptoms

Table 1. Comparison of the characteristics of research subjects between groups with anxiety and non-anxiety.

CHARACTERISTICS	ANXIETY (N= 48)		NON-ANXIETY (N= 49)		TOTAL		*P*-VALUE
	N	%	N	%	N	%	
Age							
50-54 years	9	18.75	23	46.94	32	32.99	
55-59 years	23	47.92	10	20.41	33	34.02	0.004
60-65 years	16	33.33	16	32.65	32	32.99	
Education							
Elementary school	2	4.17	0	0.00	2	2.06	
Junior high school	10	20.83	11	22.45	21	21.65	0.517
Senior high school	20	41.67	23	46.94	43	44.33	
Bachelor's degree	16	33.33	15	30.61	31	31.96	
Job							
Unemployed	34	70.83	36	73.47	70	72.16	0.772
Employed	14	29.17	13	26.53	27	27.84	
Parity							
Nullipara	9	18.75	1	2.04	10	10.31	
Primipara	7	14.58	12	24.49	19	19.59	0.042
Multipara	31	64.58	34	69.39	65	67.01	
Grand multipara	1	2.08	2	4.08	3	3.09	
BMI							
Normal	31	64.58	31	63.27	62	63.92	
Overweight	15	31.25	13	26.53	28	28.87	0.492
Obesity	2	4.17	5	10.20	7	7.22	
Duration of menopause							
< 5 years	21	43.75	34	69.39	55	56.70	
5-10 years	24	50.00	15	30.61	39	40.21	0.017
> 10 years	3	6.25	0	0.00	3	3.09	

Chi-square

Table 2. The relationship between pelvic organ prolapse and anxiety.

POP	NON-ANXIETY	ANXIETY	*P*-VALUE
Grade 3	38	7	<0.001
Grade 4	11	41	

Table 3. The relationship between pelvic organ prolapse and cortisol levels.

	GRADE 3	GRADE 4	*P*-VALUE
Cortisol Levels	15.81 ± 12.12	21.96 ± 18.31	0.133

can cause profound emotional distress, which, if prolonged, can develop into anxiety or even depression[8].

According to the study's findings, patients' anxiety levels and the extent of pelvic organ prolapse (POP) are significantly correlated. This suggests that patients' anxiety levels increase with the severity of their prolapse. This result is in line with a research by Long et al. (2021) that found that prior to surgery, patients with severe POP had a range of anxiety and depression symptoms. Among the underlying factors for this anxiety are a lack of understanding of POP, embarrassment about discussing symptoms, and reluctance to seek medical help[1]. Furthermore, patients often experience body image disturbances, frustration, and fear of developing cancer, as reported by Pham et al. (2019). Untreated anxiety can negatively impact patients' decisions to seek treatment and overall quality of life[9].

The severity of the disease affects a person's psychological well-being. More severe POP, such as grade 4, can cause sexual dysfunction, body image disturbances, urinary or defecation disorders, and chronic discomfort. All of these factors contribute to increased psychological burden and anxiety. According to Hinds and Sanchez (2022), anxiety disorders arise when individuals experience increased fear and avoidance behaviors related to conditions that threaten or disrupt their well-being. In the context of POP, physical discomfort, concerns about body image, and social stigma can trigger significant anxiety reactions[10].

Cortisol increases during times of stress as part of the body's adaptive response. The study of Dziurkowska dan Wesolowski (2021) have shown that HPA axis disorders and cortisol fluctuations significantly impact mental states, making cortisol a physiological indicator of anxiety[11]. It is the hypothalamic-pituitary-adrenal (HPA) axis that regulates cortisol secretion. The paraventricular nucleus (PVN) of the hypothalamus releases corticotropin-releasing hormone (CRH). Adrenocorticotropic hormone (ACTH) is subsequently released by the anterior pituitary as a result of this hormone's action on the adrenal cortex. In a negative feedback loop, the release of ACTH and CRH is inhibited by cortisol. There is a circadian rhythm to the HPA axis. As a result, morning cortisol levels are higher than evening cortisol levels[12,13].

Prolonged cortisol release is the method by which chronic stress causes its negative consequences over time; thus, the HPA axis seems to grow more insensitive with time. According to one theory, persistent cortisol release gradually impairs the HPA axis response, resulting in dysregulation of the HPA axis and cortisol resistance. Adrenal exhaustion brought on by prolonged, chronic stress can lower cortisol levels in the blood[14,15].

Limitations of this study are the use of blood samples, some of which were lysed during the study. This study only measured serum cortisol levels and did not measure salivary or urinary cortisol levels. This study also using a limited sample size. Furthermore, we did not control for factors that could effect the increase in cortisol levels, such as lifestyle and economic status. For future research, we recommend using different sample biomarkers and questionnaire variables. Future researchers could also consider other factors influencing cortisol levels, such as the subjects' lifestyle or economic status, which could potentially contribute to research bias.

Conclusion

An increased anxiety in Pelvic Organ Prolapse patients is not entirely mediated by increased cortisol levels, but is also influenced by psychosocial factors, individual perceptions and long-term adaptation to stress.

Conflict of Interest

The authors declares no conflict of interest.

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