# Anxiety Levels, Cortisol, Blood Gluc Ose and Sodium Levels in Working Wives: Comparison Between Husbands Who Were Hospitalized and Husbands Who Were Not Hospitalized

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## ABSTRACT

**Background;** Anxiety affects balance and physiological changes in the body. The research aims to investigate the comparison of anxiety levels, blood cortisol levels, blood glucose levels and blood sodium levels between working wives of husbands who are hospitalized and working wives of husbands who are not hospitalized. **Methods:** The research design uses statistical group comparison. The research subjects were 40 people divided into 2 groups, namely 20 subjects, working wives, husbands who were hospitalized, 20 subjects, working wives, husbands, who were not hospitalized. Data was collected using the HARS (Hamilton Anxiety Rating Scale) questionnaire instrument, laboratory examination of blood cortisol levels, blood glucose levels and blood sodium levels. **Results:** Unpaired t test with a significant value of p < 0.05 if the data is normally distributed or Mann Whitney U Test with a significant value of p < 0.05 if the data is not normally distributed was carried out to analyze the comparison of anxiety levels, blood cortisol levels, sugar levels blood and blood sodium levels. Data processing with the help of statistical software. The results of the analysis showed that there were differences in anxiety levels (p<0.05), blood cortisol levels (p<0.05) and blood glucose levels (p<0.05) but there were no differences in blood sodium levels (p>0.05). between working wives whose husbands are hospitalized and working wives whose husbands are not hospitalized. **Conclusion:** blood cortisol levels and blood sugar levels in working wives of husbands who were hospitalized were higher than working wives of husbands who were not hospitalized and based on statistical tests, significant differences were found in HARS values, blood cortisol levels and blood sugar levels between the group of working wives whose husbands were hospitalized. hospitalized and the wife works, the husband is not hospitalized.

**Key words**: Anxiety, working wife, HARS, blood cortisol levels, blood glucose levels, blood sodium levels.

## INTRODUCTION

Stress and anxiety have an effect on the body. According to Selye, the concept of stress is a non-specific sign and symptom of an illness1. Marked changes in stress and anxiety are associated with cortisol levels which are referred to as mediators of stress, anxiety and depression symptoms. This has been proven by previous researchers that relaxation interventions can reduce anxiety and depression which lead to changes in the hormone cortisol[2]. Stress-induced changes in cortisol show significant results[3].

Anxiety causes psychological and physical responses[4]. Most psychological and physical responses occur due to the activity of two neuro-endocrine systems controlled by the hypothalamus, namely the sympathetic system and the adrenal cortex system. The hypothalamus is the part of the brain that is the anxiety center because of its dual function in emergencies, namely: firstly, it activates the sympathetic branch of the autonomic nervous system. The sympathetic branch of the autonomic nervous system reacts directly on smooth muscles and internal organs to produce several changes in the body. The sympathetic system also stimulates the adrenal medulla to release the hormones epinephrine and norepinephrine. Second, the hypothalamus stimulates the anterior pituitary gland by releasing Cortico Releasing

Hormone (CRH). Next, the pituitary gland secretes Adreno Corticotropin Hormone (ACTH). Adeno Corticotropin Hormone stimulates the outer layer of the adrenal glands (adrenal cortex) which causes the release of the hormone cortisol which regulates the levels of glucose and certain minerals in the blood. The amount of cortisol in a blood or urine sample can be used as an anxiety parameter[5,6,7.]

The release of cortisol and other steroid hormones by the adrenal cortex strengthens the vasoconstrictor response which results in decreased flow to the kidneys leading to the release of renin, this results in the formation of angiotensin I which is converted into angiotensin II, then aldosterone secretion occurs by the adrenal cortex. The hormone aldosterone causes the kidney tubules to retain sodium and water, resulting in an increase in blood volume[8,9.]

Everyone must have experienced anxiety at some point, and to varying degrees. This may happen because individuals feel they do not have the ability to face things that might happen to them in the future. Mental pressures such as anxiety, depression and stress are felt differently in each individual. Previous research findings stated that anxiety, stress and depression in working and non-working women were influenced differently by social support and marital status[10]. Women who do not work have higher levels of stress than women who work[11]. Previous researchers reported that working and

married women have better reproductive health status than working women who are not married or divorced[12.]

Anxiety arises from facing a threatening situation[13]. The husband being hospitalized is a stressor that causes anxiety in the wife. On the other hand, the role of women is changing, not only as housewives but also playing an active role in improving the family economy[12] so that women also play a role in the world of work[14]. It is assumed that the husband's hospitalization and responsibility for work are sources of stress that can result in anxiety, stress and depression.

The body's natural response due to anxiety and stress releases the hormone cortisol through activation of the Hypothalamus Pituitary Adrenal (HPA) axis, at the same time releasing the hormone adrenaline/noradrenaline through the sympathetic nervous system[3]. Research studies on anxiety and stress in working and non-working women have been carried out by previous researchers by comparing stress levels and cortisol levels, but no researchers have yet measured anxiety in working wives of husbands who were hospitalized compared to working wives of husbands who were not hospitalized and studied physiological response to cortisol levels, blood sugar levels and blood sodium. The aim of the research was to investigate differences in anxiety levels, blood cortisol levels, blood sugar levels and blood sodium levels of working wives whose husbands were hospitalized and working wives whose husbands were not hospitalized. Research refers to the Simic concept[15], the stimulus received converges on the lateral amygdala and then directly regulates autonomic nervous responses and depends on the context of Autonomic Nervous System (ANS) behavior, reflexes and hormone secretion[15]. Cortisol levels in the blood measure anxiety parameters[6].

## MATERIALS AND METHOD

### Study type, design and participants

This type of research is an experiment using a statistical group comparison design, namely comparing two groups that received exposure (treatment). This design is a evelopment of a laboratory experimental study of two groups that compared the exposure received[16]. Relevant to previous researchers comparing anxiety and the effects of cortiso[13]. The exposure received by study participants was the husband's working wife who was hospitalized, then compared to the husband's working wife who was not hospitalized.

The research was conducted at Dr. Pirngadi Medan, North Sumatra Province in the inpatient unit in July 2019. The research subjects were working wives whose husbands were hospitalized at Dr. Hospital. Pirngadi Medan numbered 20 people and working wives and husbands who were not hospitalized numbered 20 people. Study participants were not differentiated based on ethnicity, religion, education and gender. The inclusion criteria were determined: participants who were willing to take part in the study until completion, aged over 18 years, working women whose husbands were hospitalized, working women whose husbands were not hospitalized, and who signed informed consent were eligible as study participants. The research has obtained permission from the health research ethics commission of the University of North Sumatra

### Instruments and data collection techniques

Data collection used the standardized HARS (Hamilton Anxiety Rating Scale) questionnaire instrument so there was no need to test validity and reliability. Study participants were asked to fill out the HARS questionnaire with 14 questions and give a score for each item with a score of 0: no symptoms, score 1: mild symptoms/less than half of the existing symptoms, score 2: moderate symptoms/half of the existing symptoms, score 3 : severe symptoms/more than half of the existing symptoms, score 4: very severe symptoms/all of the existing symptoms[17].

After all items have been answered by the respondent, the HARS questionnaire paper is returned to the researcher for analysis referring to the HARS score. The total HARS score is classified into 5 levels of anxiety, namely: score <14 = no anxiety, score 14 –20 = mild anxiety, score 21 –27 = moderate anxiety, score 28 – 41 = severe anxiety, and score 42 –56 = severe anxiety very.

Research subjects also underwent laboratory tests for blood cortisol levels, blood sugar levels and blood sodium levels. Examination and blood sampling were carried out by the Prodia Medan laboratory team. Cortisol examination using the CMIA (Chemiluminescent Microparticle Immunoassay) cortisol method, Blood Sugar Levels: Hexokinase, Sodium examination: ISE (Electronic Selective ion) DIREK. The examination results were compared with normal values, namely: Morning blood cortisol normal value 4.30-22.40 µg/dL (Dziurkowska, 2021). Normal blood sugar levels < 140 mg/dL. Normal blood sodium value is 135-145 mmol/L[5].

### Data analysis

Descriptive analysis was carried out for study participant characteristic variables such as age, type of work, and income category. Testing the differences between groups of working wives with husbands who were hospitalized and working wives with husbands who were not hospitalized, variables such as anxiety, blood cortisol levels, blood sugar levels and blood sodium levels were carried out using an independent t-test which was previously tested for normality of the data. Data that was not normally distributed was blood sugar levels so the difference test was carried out using the Mann-Whitney Test. The test results for differences in mean values, standard deviation and p-value are reported in table form. A variable is significant if the p-value is smaller than 0.05. Analysis using SPSS Version 24.0 software

## RESULTS

### Participant characteristics

Characteristics of study participants: average age $48 \pm 14$ years in the management group and average age $51 \pm 12$ years in the non-management group. The majority job category is working as an entrepreneur, 17 people (42.5%) and the majority income is in the range of 1 – 3 million, 30 people (75%).

### Statistical test of research results

Respondents' anxiety was measured using the HARS questionnaire, blood cortisol levels, blood sugar levels and blood sodium levels were compared between groups of working wives whose husbands were hospitalized and working wives whose husbands were not hospitalized.

### Comparison of HARS Value

Figure 1 Bar diagram. Analysis of the HARS score data for the managed and non-managed groups, 20 respondents each using a statistical test of normally distributed data followed by an unpaired t test, it can be seen that the HARS score is greater in the managed group than in the non-managed group. The mean HARS value in the managed group was $21 \pm 7$ and in the non-managed group the value was $4 \pm 3$, which is statistically significant, p=0.001. Further information is that in the group of non-managing wives, no one had a HARS score of more than 14, all of them had normal scores (<14). Meanwhile, in the management group, only 2 people were not anxious with a HARS score (<14), the rest experienced anxiety with anxiety levels ranging from mild to severe, but no one experienced very severe anxiety levels (HARS > 42).

**Table 1.** Characteristics of basic data of research subjects.

| Varables | Kelompok | | p Value |
| | Kelola | Non-kelola | |
|---|---|---|---|
| Age (mean±SD) year | x̄ = 48 ± 14 | x̄ = 51 ± 12 | 0.51 |
| Occupation | | | |
| State civil servants | n = 6 (30%) | n = 4 (20%) | |
| Private | n = 6 (30%) | n = 7 (35%) | 0.60 |
| Business | n = 8 (40%) | n = 9 (45%) | |
| Income | | | |
| Rp. 1.000.000 – Rp. 3.000.000 | n = 14 (70%) | n = 16 (80%) | |
| Rp. 3.000.000 – Rp. 5.000.000 | n = 6 (30%) | n = 4 (20%) | |
| Rp. 5.000.000 < | n = 0 ( 0%) | n = 0 ( 0%) | 0.47 |

**Table 2.** Statistical test results comparing HARS values, blood cortisol levels, blood sugar levels, and blood sodium levels of working wives of husbands who were hospitalized and working wives of husbands who were not hospitalized (n=40).

| Variable | Group | Mean | SD | P-value |
|---|---|---|---|---|
| HARS | Wife works | 21 | 7 | 0,001* |
| | Wife doesn't work | 4 | 3 | |
| Blood cortisol levels | Wife works | 10,680 | 3,1768 | 0,03* |
| | Wife doesn't work | 8,400 | 2,9773 | |
| Blood sugar levels | Wife works | 119 | 30,20 | 0,04* |
| | Wife doesn't work | 110 | 47,99 | |
| Blood sodium levels | Wife works | 142 | 1,60 | 0,55 |
| | Wife doesn't work | 141 | 2,02+ | |

Notes: *Sig. (p-value = 0,05)

## Comparison of blood cortisol

Figure 2 Bar diagram. Analysis of cartisol data from the managed and non-managed groups, 20 respondents each with a statistical test of normally distributed data followed by an unpaired t test, it can be seen that cartisol is greater in the managed group than in the non-managed group as measured in micrograms per unit. deciliter. The mean value of cortisol in the management group was 10.68 ± 3.18 ug/dl and in the non-management group 8.40 ± 2.98 ug/dl, which was statistically significant, p=0.03. Further information is that in the management group the lowest cortisol was 4.90 ug/dl and the highest was 16.60 ug/dl. Meanwhile, in the non-managed group, the lowest cortisol was 1.90 ug/dl and the highest was 13.80 ug/dl. but neither of the two groups had morning cortisol above normal.

## Comparison of KGD

Figure 3 Bar diagram. Data analysis of blood glucose levels in the managed and non-managed groups, 20 respondents each, using a statistical test of data that was not normally distributed, followed by an unpaired Mann Whitney test, it can be seen that the value of blood glucose levels was greater in the managed group than in the non-managed group. Manage it as measured in micrograms per deciliter. Blood glucose level measurement data is attached. The mean value of blood glucose levels in the management group was 119 ± 30.20 mg/dl and in the non-management group 110 ± 47.99 mg/dl, this difference was statistically significant, p=0.04. Further information is that in the management group the lowest blood glucose level was 86 mg/dl and the highest was 220 mg/dl. Meanwhile, in the non-managed group, the lowest KGD level was 61 mg/dl and the highest was 241 mg/dl.

## Blood sodium ratio

Figure 4 Bar diagram. Analysis of sodium data from the managed and non-managed groups, 20 respondents each using a statistical test of normally distributed data followed by an unpaired t test, it can be seen that the sodium value is greater in the managed group than in the non-managed group as measured in millimoles. per liter sodium measurement data attached. The mean value of sodium
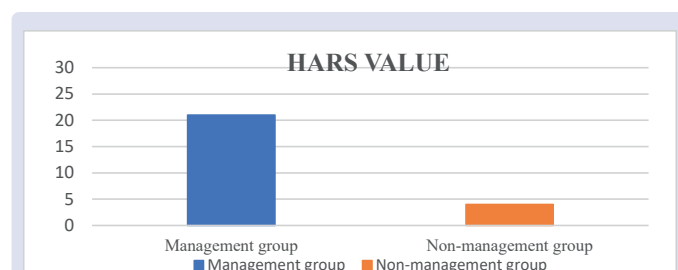


**Figure 1.** Bar diagram of distribution of respondents in management groups and Non-managed group based on HARS scores.
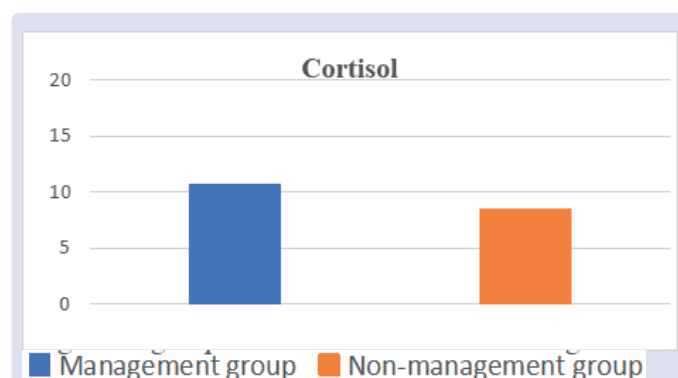


**Figure 2.** Bar diagram of distribution of respondents in the management group and non-managed based on blood cortisol (data attached).

levels in the management group was 142 ± 1.60 mmol/L and in the non-management group 141 ± 2.02 mmol/L, this difference was not statistically significant, p=0.55. Further information, in the managed group, the sodium that appeared most often was 140 mmol/L, 141 mmol/L and 143 mmol/L, totaling 5. Meanwhile, in the non-managed group, the most frequently appeared sodium was 139 mmol/L and 143 mmol/L. L each totals 5.
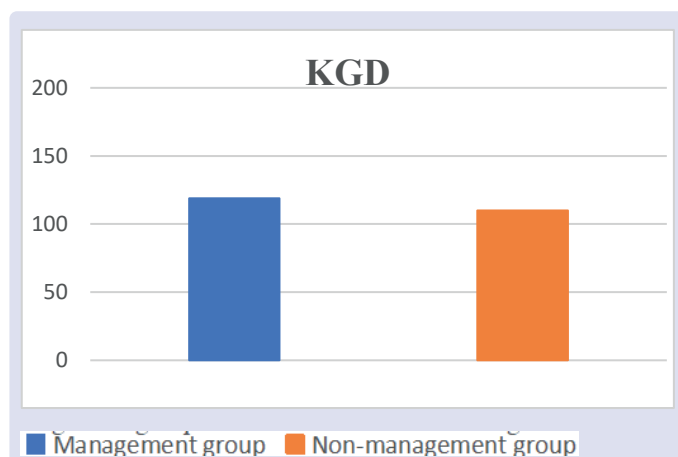
**Figure 3.** Data analysis of blood glucose levels in the managed and non-managed groups, 20 respondents each, using a statistical test of data that was not normally distributed, followed by an unpaired Mann Whitney test, it can be seen that the value of blood glucose levels was greater in the managed group than in the non-managed group.
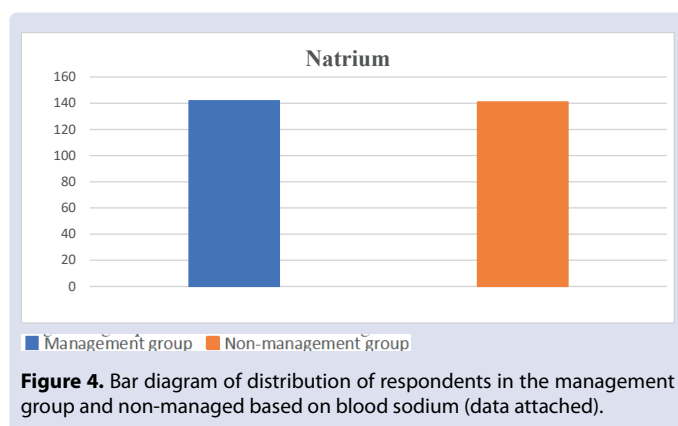


**Figure 4.** Bar diagram of distribution of respondents in the management group and non-managed based on blood sodium (data attached).

The results of the analysis showed differences in HARS scores, blood cortisol levels and blood sugar levels in the group of working wives whose husbands were hospitalized, and husbands who were not hospitalized.

## DISCUSSION

The results of the study showed that anxiety among working wives whose husbands were hospitalized was higher than for husbands who were not hospitalized. Relevant to previous researchers' reports, observations of pathological symptoms of depression and salivary cortisol measurements showed results that were in line with reduced anxiety (DASS-21 values)[2].

Mental pressure such as anxiety, depression and stress in married women is influenced by social support in the family. Social support is obtained from family such as husband or wife, parents and children. Research highlights the anxiety of working wives because their husbands are hospitalized, meaning that wives lose social support from their husbands because their husbands' condition is being treated and even becomes pressure for the wife. Anxiety and stress responses can increase due to systemic inflammation, thereby activating the adrenal hypothalamus which correlates with cortisol18. Selye's experiments placed experimental animals in stressful situations resulting in atrophy of the lymphatic system, enlargement of the adrenal glands, and gastric ulcers[1].

Other researchers reported that in Pakistan married women showed positive relationships and received social support regardless of their

working status and those who did not work had lower stress than working women19. Other researchers reported that in Indonesia women who work and are married have a healthier physical health status than women who work but are not married. Likewise, the reproductive health status and mental health status of working women are better than those who do not work[12].

The wife's concern about working because her husband is hospitalized is related to her responsibility as a wife to care for her husband, but the wife also has the responsibility to work and must be absent from work for a long time. From an economic perspective, a working wife can help the family's economy even though she cannot fully meet all the family's needs, which can cause anxiety for working wives. The wife is a family member who feels the direct impact of her husband's inability to support the family, while the indirect impact is that the child temporarily loses the role of a father. Research conducted by Riazuelo20 explains that if one of the family members undergoes treatment in hospital, the family experiences various problems such as fatigue, trauma, hopelessness and anxiety.

The results of the study found that there was a significant difference in the blood sugar levels of working wives whose husbands were hospitalized and husbands who were not hospitalized. The results of this study are in accordance with the results of research conducted by previous researchers that stress increases blood sugar levels21. Research by Adam et al22 shows that when stressed the blood sugar levels of people with Diabetes Millitus type-2 increase. Other researchers report a significant relationship between anxiety and increased blood sugar levels23. The weakness of this study was that it did not examine the research subjects' history of drug use. Previous researchers stated that long-term use of drugs such as steroids carries a risk of diabetes, however, it was explained that immune modulation can occur without a steroid response[24].

Cortisol can increase epinephrine activity, causing vasoconstriction (narrowing of blood vessels) by non-genomic mechanisms[25]. Epinephrine affects glucose metabolism, released epinephrine triggers glyconeogenesis in the liver. This glyconeogenesis process will result in glucose being released from the body's cells into the blood so that blood sugar levels increase26. Vasoconstriction of renal afferent arterioles indirectly stimulates renin secretion by reducing oxygenated blood flow to the kidneys which ultimately activates the renin-angiotensin-aldosterone (SRAA) system, causing an increase in sodium[26].

It is reported that the psychological conditions of anxiety, stress and depression have a complex relationship with eating patterns and working time in female workers based on measurements of the Percieve Stress Scale (PSS-10) and salivary cortisol. High stress is associated with dietary patterns, and increased consumption of light, energy-dense and ready-to-eat foods[27]. Those working on the night shift system tend to experience higher levels of fatigue because during the day they have activities outside of work[28]. Chronic stress activates the HPA axis altering glucose metabolism and increasing insulin resistance, causing hormonal changes related to appetite[29].

Working women whose husbands are hospitalized experience higher anxiety than husbands who are not hospitalized, which is inconsistent with other researchers. Previous researchers looked at the psychological experiences of families when couples were treated for chronic illnesses. Some partners display hopelessness, excessive anxiety, and exhaustion. However, other research subjects showed great adaptability even though their partners were seriously ill and being treated. Consultation and support provided by people around them, makes it easier for someone to overcome anxiety[20]. Adaptive behavior, perception, cognition, motivation synchronized from cortical and subcortical neural networks are modulated by the role of the amygdala[15]. It is reported that the quality of life of women who work is better than those

who do not work. Working women have better cognitive function and health and lower levels of depression[30]. Those who work are able to overcome anxiety because they receive support from their family and work environment[31-35].

The results of the anxiety difference test and sodium levels of the groups of working wives whose husbands were hospitalized and working wives whose husbands were not hospitalized did not show any differences. This study contrasts with previous studies which reported that cortisol was higher in samples with hypernatremia. Stress hyponatremia and hypernatremia are sufficient to cause an increase in cortisol. Elevated cortisol is a response to hypernatremia, and a stress response to disease[31,36,37]. Hyponatremia is caused by renal sodium hypovolemia which can stimulate antidiuretic hormone (ADH). Antideuretic hormone secretion is stimulated by hypothalamic corticotrophin releasing hormone (CRH) which is secreted in response to cortisol deficiency[32].

## CONCLUSION

The results of the study showed that HARS, blood cortisol levels and blood sugar levels in working wives of husbands who were hospitalized were higher than working wives of husbands who were not hospitalized and based on statistical tests, significant differences were found in the HARS values, blood cortisol levels and blood sugar levels between the groups. husband's working wife who is hospitalized and husband's working wife who is not hospitalized. However, there was no difference in blood sodium levels between the group of working wives whose husbands were hospitalized and working wives whose husbands were not hospitalized.

## CONFLICTS OF INTEREST

There are no conflicts of interest between the authors.

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