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AN ANALYTICAL STUDY OF NUTRITIONAL STYLE, NUTRITIONAL STATUS, AND MENTAL HEALTH IN THE PRECONCEPTION PERIOD : (TOWARDS OPTIMAL PREGNANCY OUTCOMES)

Nur Cholila [1], *Nur Maziyah Hurin'in* [2], *Tri Yunita Fitria Damayanti* [3]

[1,2,3] Institut Ilmu Kesehatan Nahdlatul Ulama Tuban

Correspondence address:
Tuban, Jawa Timur, Indonesia
Email : ncholilla@gmail.com

Abstract

Background: The preconception period is a crucial period to optimize maternal and fetal health. Preconception nutrition can affect nutritional status and mental health which has an impact on pregnancy readiness. This study aims to analyze the correlation between nutrition and nutritional status and mental health during the preconception period. **Method:** This study used a prospective cohort study involving women of childbearing age selected by stratified random sampling to obtain 129 respondents. Nutritional Style data were collected through FFQ questionnaires, nutritional status was measured through anthropometry and Hemoglobin examination, and mental health was measured using the DASS questionnaire. Data collection was carried out three times and analyzed using the Pearson correlation test, multiple linear regression and the Wilcoxon test for longitudinal analysis. **Result:** The results showed that there was no significant correlation between Nutritional Style and BMI (p-value>0.05). However, there was a significant correlation between Nutritional Style and the incidence of anemia, the strongest correlation in the first measurement (p-value 0.001) and the second measurement (p-value 0.049). A significant correlation was found between Nutritional Style and mental health, especially anxiety in the first measurement (p-value 0.022), the second measurement (p-value 0.006) and the third measurement (p-value 0.029), but not with stress and depression. There was a significant increase in nutritional status from the first to the second measurement (p-value 0.020) and the first to the third measurement (p-value 0.003). There was a significant decrease in anxiety from the first to the second measurement (p-value 0.034) and the first to the third measurement (p-value 0.000). **Conclusion :** Good Nutritional Style during preconception can improve nutritional status and minimize mental health risk. Nutrition intervention programs are needed to improve knowledge and implementation of healthy food nutrition. In addition, regular monitoring of nutritional status and mental health is also needed to optimize pregnancy readiness.

keyword : Nutritional Style, Preconception, Nutritional Status, Mental Health, Pregnancy Readiness

INTRODUCTION

The preconception period or the period before conception is a crucial time to optimize the health of the mother and the baby (Bhutta et al., 2013). During this time, various factors including lifestyle and diet can affect mental health and nutritional status which can impact pregnancy readiness and fetal health.

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Nutritional Style, which refers to eating habits and habits related to food, can be a determining factor for mental health and nutritional status. Research shows a strong correlation between Nutritional Style and mental health. Unhealthy eating habits, such as consuming processed foods high in sugar and fat, are associated with an increased risk of depression and anxiety (Firth et al., 2019). Chen found that diets high in fat and sugar, and low in fruit and vegetable intake were associated with a higher risk of depressive and anxiety symptoms (Chen et al., 2023). Meanwhile, a diet containing fruits, vegetables, and whole grains is associated with better mental health (Lassale et al., 2019). Khaled et al (2021) found that intake of fruits, vegetables, nuts and seeds was significantly negatively associated with stress in women of childbearing age.

Nutritional Style also has a significant effect on nutritional status. Insufficient nutrient intake can cause micro and macro nutrient deficiencies that can have a negative impact on the health of the mother and fetus. Deficiencies in iron, folic acid, and vitamin D can increase the risk of anemia, birth defects, and other pregnancy complication (Bhutta et al., 2013). Obeid et al (2019) confirmed that low folate status is associated with congenital birth defects including NTDs, congenital heart defects, LBW and preterm birth.

Although there is evidence of an association between nutritional lifestyle and mental health and nutritional status, there is little research examining this association specifically in the preconception period. Most studies focus on the effects of nutritional lifestyle during pregnancy, while the preconception period is often neglected (Amini, P., Asif, H., & Jeyaseelan, 2020). In fact, the preconception period is an important period to prepare yourself to be ready to undergo a healthy pregnancy. Interventions during the preconception period can provide significant benefits in improving maternal and child health (Stephenson, 2018). This problem is significant in Tuban Regency, considering that the prevalence of anemia and malnutrition in Women of Childbearing Age is still quite high because. Data from the Tuban Regency Health Office in 2023, the prevalence of anemia in Women of Childbearing Age reached 10.09% while the prevalence of malnutrition reached 18.07% (Tuban Regency Health Office and P2KB, 2023).

Therefore, this study aims to analyze the correlation between Nutritional Style and nutritional status and mental health during the preconception period in Tuban Regency. This study is expected to provide an important contribution to understanding the role of Nutritional Style in optimizing pregnancy readiness, as well as developing effective nutritional and mental health intervention strategies to improve the health of Women of Childbearing Age, so as to reduce the risk of pregnancy complications and improve the health of future generations.

METHOD

This study used a quantitative analytical approach with a prospective cohort study design to analyze the correlation between Nutritional Style and nutritional status and mental health during the preconception period. The population in this study were all women of childbearing age (18-35 years) in Tuban Regency, East Java Indonesia who were planning a pregnancy, with a total of 192 respondents who met the criteria. The inclusion criteria in this study include: women of childbearing age (18-35 years), planning a pregnancy, not yet pregnant when the study began, have a normal menstrual cycle and are willing to be respondents. While the exclusion criteria include: having a clinical medical condition that can affect nutritional status and mental health, undergoing treatment, having an eating disorder status. To obtain accurate and representative data, this study used a stratified random sampling technique based on age as a stratification variable that had met the criteria. This age grouping was carried out because age can affect nutritional status, mental health and eating habits. Age is divided into three strata: 18-24 years, 25-29 years and 30-35 years. Then the proportion of each stratum was calculated based on the number of Women Of Childbearing Age in each group by considering the sample size, a total sample of 129 respondents was obtained using the stratified random sampling method.

Nutritional Style data was collected through FFQ questionnaire, nutritional status was measured through anthropometry (height, weight, arm circumference, waist circumference) and Hemoglobin examination, and mental health was measured using the DASS questionnaire. Data were collected three times in a row with an interval of one month, then the data were analyzed using the Pearson

correlation test to determine the correlation between Nutritional Style and nutritional status and mental health, then multiple linear regression analysis was carried out to determine the most influential factors and longitudinal analysis using the Wilcoxon test to see changes in nutritional status and mental health. This research has been approved by the Research Ethics Board of the Nahdlatul Ulama Tuban Health Sciences Institute.

RESULT AND DISCUSSION

Table 1. Distribution of Respondent Characteristics

Characteristics	Category	f	%
Age	18 -24 years old	43	33.3
	25 – 29 Years	43	33.3
	30 – 35 Years	43	33.3
TOTAL		**129**	**100**
Education	Elementary School	2	1.6
	Junior High School	19	14.7
	Senior High School	72	55.8
	Diploma	12	9.3
	Bachelor	24	18.6
TOTAL		**129**	**100**
Work	Housewife	71	55.0
	Self-employed	18	13.9
	Private employees	14	10.9
	Civil Servant	1	0.8
	Other	25	19.4
TOTAL		**129**	**100**
Knowledge	Not enough	35	27.1
	Enough	6	4.7
	Good	88	68.2
TOTAL		**129**	**100**
Attitude	Not enough	27	20.9
	Enough	21	16.3
	Good	81	62.8
TOTAL		**129**	**100**

Based on table 1, it can be seen that the proportion of respondents' ages is equal because respondents have been selected based on age strata. While in terms of education level, it is dominated by high school graduates (55.8%) with the majority of respondents (55%) working as housewives.

From the distribution table above, it shows that most respondents (68.2%) have good knowledge about Nutritional Style. Also, most respondents (62.8%) have a good attitude about Nutritional Style.

Table 2. Distribution of Respondents Nutritional Status

Indicator	Category	Measurement 1		Measurement 2		Measurement3	
		f	%	f	%	f	%
IMT	Thin	17	13.2	13	10.1	9	7.0
	Normal	87	67.4	88	68.2	94	72.9
	Fat	25	19.4	28	21.7	26	20.2
TOTAL		**129**	**100**	**129**	**100**	**129**	**100**
LILA	KEK	23	17.8	23	17.8	23	17.8
	Normal	106	82.2	106	82.2	106	82.2
TOTAL		**129**	**100**	**129**	**100**	**129**	**100**
LP	Excess	49	38.0	49	38.0	49	38.0
	Normal	80	62.0	80	62.0	80	62.0
TOTAL		**129**	**100**	**129**	**100**	**129**	**100**
Hemoglobin levels	Anemia	21	16.3	21	16.3	18	14.0
	No Anemia	108	83.7	108	83.7	111	86.0
TOTAL		**129**	**100**	**129**	**100**	**129**	**100**

Table 2 show prevalence of nutritional status based on BMI most respondents have normal nutritional status. Respondents with normal BMI experienced an increase at each measurement time to reach 72.9%, while respondents with thin BMI decreased. The prevalence chronic lack of energy based on arm circumference was recorded at 17.8%, while the prevalence of excess abdominal circumference reached 38%. Hb levels showed a prevalence of anemia of 16.3% and decreased to 14%.

Table 3. Distribution of Respondents Mental Health

Indicator	Category	Measurement 1		Measurement 2		Measurement3	
		f	%	f	%	f	f
Anxiety	Normal	81	62.8	82	63.6	94	72.9
	Light	27	20.9	29	22.5	24	18.6
	Currently	14	10.9	13	10.1	6	4.7
	Critical	6	4.7	4	3.1	5	3.9
	Very Severe	1	0.8	1	0.8	0	0.0
TOTAL		**129**	**100**	**129**	**100**	**129**	**100**
Stress	Normal	124	96.1	124	96.1	123	95.3
	Light	3	2.3	4	3.1	5	3.9
	Currently	1	0.8	0	0.0	0	0.0
	Critical	1	0.8	1	0.8	1	0.8
	Very Severe	0	0.0	0	0.0	0	0.0
TOTAL		**129**	**100**	**129**	**100**	**129**	**100**
Depression	Normal	125	96.9	126	97.7	125	96.9
	Light	4	3.1	3	2.3	4	3.1
	Currently	0	0.0	0	0.0	0	0.0
	Critical	0	0.0	0	0.0	0	0.0
	Very Severe	0	0.0	0	0.0	0	0.0
TOTAL		**129**	**100**	**129**	**100**	**129**	**100**

Table 3 shows that the majority of respondents did not experience depression, but a small number of respondents (3.1%) experienced mild depression.

For anxiety, the distribution of respondents' anxiety levels was even from normal to severe anxiety. Most respondents (62.8%) were in the normal category and this category continued to increase to 72.9% in the third measurement. While at the mild, moderate and severe anxiety levels there was a decrease in percentage, in mild anxiety it decreased from 20.9% to 18.6% although it had increased in the second measurement. In moderate anxiety there was a significant decrease in percentage from 10.9% to 4.7%. While in severe anxiety it decreased from 47% to 3.9%. Finally, the majority of stress levels fall into the normal category, but there are still respondents who experience mild, moderate to severe stress, although the percentage is very small.

Table 4. Distribution of Respondents Nutritional Style Patterns

Indicator	Category	Measurement 1		Measurement 2		Measurement 3	
		f	%	f	%	f	%
Healthy food	Good	59	45.7	58	45.0	60	46.5
	Not good	70	54.3	71	55.0	69	53.5
TOTAL		**129**	**100**	**129**	**100**	**129**	**100**
Unhealthy Food	Good	81	62.8	80	62.0	80	62.0
	Not good	48	37.2	49	38.0	49	38.0
TOTAL		**129**	**100**	**129**	**100**	**129**	**100**

Table 4 shows the Nutritional Style measurements on three different measurements. It can be seen that healthy eating habits increased during the three measurements from 45.7% to 46.5%. In addition, unhealthy eating habits showed a lower average percentage.

Table 5. Correlation between Nutritional Style and Nutritional Status

1st Measurement					
Nutritional Style Healthy food	**Nutritional Status (BMI)**				**p-Value**
	Thin	**Normal**	**Fat**	**Total**	
Not good	11	48	11	70	0.179
Good	6	39	14	59	
Total	**17**	**87**	**25**	**129**	
Nutritional Style Unhealthy Food	**Nutritional Status (BMI)**				**p-Value**
	Thin	**Normal**	**Fat**	**Total**	
Not good	4	38	6	48	0.756
Good	13	49	19	81	
Total	**17**	**87**	**25**	**129**	
2nd Measurement					
Nutritional Style Healthy food	**Nutritional Status (BMI)**				**p-Value**
	Thin	**Normal**	**Fat**	**Total**	
Not good	10	48	13	71	0.093
Good	3	40	15	58	
Total	**13**	**88**	**28**	**129**	
Nutritional Style Unhealthy Food	**Nutritional Status (BMI)**				**p-Value**
	Thin	**Normal**	**Fat**	**Total**	
Not good	4	36	9	49	0.820
Good	9	52	19	80	
Total	**13**	**88**	**28**	**129**	
3rd Measurement					
Nutritional Style Healthy food	**Nutritional Status (BMI)**				**p-Value**
	Thin	**Normal**	**Fat**	**Total**	
Not good	7	50	12	69	0.154
Good	2	44	14	60	
Total	**9**	**94**	**26**	**129**	
Nutritional Style Unhealthy Food	**Nutritional Status (BMI)**				**p-Value**
	Thin	**Normal**	**Fat**	**Total**	

Not good	2	38	9	49	
Good	7	56	17	80	0.847
Total	**9**	**94**	**26**	**129**	

The results of the analysis showed that there was no significant correlation between Nutritional Style and nutritional status (BMI) in preconception women in Tuban Regency East Java Indonesia. This can be seen from the p-value obtained in all measurements (p-value >0.05)

Table 6. Correlation between Nutritional Style and the Incidence of Anemia

1st Measurement				
Nutritional Style Healthy food	**Anemia (Hb)**			**p-Value**
	Anemia	**No Anemia**	**Total**	
Not good	10	60	70	
Good	11	48	59	0.001
Total	**21**	**108**	**129**	
Nutritional Style Unhealthy Food	**Anemia (Hb)**			**p-Value**
	Anemia	**No Anemia**	**Total**	
Not good	8	40	48	
Good	13	68	81	0.928
Total	**21**	**108**	**129**	
2nd Measurement				
Nutritional Style Healthy food	**Anemia (Hb)**			**p-Value**
	Anemia	**No Anemia**	**Total**	
Not good	10	61	71	
Good	11	47	85	0.459
Total	**21**	**108**	**129**	
Nutritional Style Unhealthy Food	**Anemia (Hb)**			**p-Value**
	Anemia	**No Anemia**	**Total**	
Not good	12	37	49	
Good	9	71	80	0.049
Total	**21**	**108**	**129**	
3rd Measurement				
Nutritional Style Healthy food	**Anemia (Hb)**			**p-Value**
	Anemia	**No Anemia**	**Total**	
Not good	9	60	69	
Good	9	51	60	0.179
Total	**18**	**111**	**129**	
Nutritional Style Unhealthy Food	**Anemia (Hb)**			**p-Value**
	Anemia	**No Anemia**	**Total**	
Not good	10	39	49	
Good	8	72	80	0.751
Total	**18**	**111**	**129**	

The results of the analysis showed that there was no significant correlation between Nutritional Style and the incidence of anemia in preconception women in Tuban Regency, especially in the 1st measurement (p-value = 0.001) and the 2nd

measurement (p-value = 0.049). However, in the 3rd measurement there was no correlation between Nutritional Style and the incidence of anemia.

Table 7. Modeling Multiple Logistic Regression Nutritional Style factors that influence nutritional status based on BMI anthropometry at the 1st measurement

Variables	Unstandardized Coefficients		p-Value	Exp (B)
	B	Std Error		
Nutritional Style healthy food	0.144	0.105	0.172	1,372
Nutritional Style unhealthy food	0.092	0.107	0.394	856
Knowledge	0.287	0.137	0.038	2,093
Attitude	0.266	0.149	0.077	1,785
Constant	0.987	0.187	0,000	5.285

The results of the regression analysis are shown in table 8. In the first measurement, the variable that significantly influenced the nutritional status of pre-conception women was Nutritional Style knowledge with a p-Value of 0.038 <0.05. The results of the Odds Ratio analysis of the knowledge variable were 2,093, meaning that women who lacked knowledge about Nutritional Style had a 2,093 times risk of experiencing abnormal nutritional status compared to those with good knowledge about Nutritional Style.

Table 8. Correlation between Nutritional Style and Mental Health

1st Measurement							
Nutritional Style Healthy food	**Anxiety**						
	Normal	**Light**	**Currently**	**Critical**	**Very Severe**	**Total**	**p-Value**
Not good	50	12	7	0	1	70	0.022
Good	31	15	7	6	0	59	
Total	**81**	**27**	**14**	**6**	**1**	**129**	
Nutritional Style Unhealthy Food	**Anxiety**						
	Normal	**Light**	**Currently**	**Critical**	**Very Severe**	**Total**	**p-Value**
Not good	26	11	9	2	0	48	0.207
Good	55	16	5	4	0	81	
Total	**81**	**27**	**14**	**6**	**0**	**129**	
Nutritional Style Healthy food	**Stress**						
	Normal	**Light**	**Currently**	**Critical**	**Very Severe**	**Total**	**p-Value**
Not good	69	1	0	0	0	70	0.090
Good	55	2	1	1	0	59	
Total	**124**	**3**	**1**	**1**	**0**	**129**	
Nutritional Style Unhealthy Food	**Stress**						
	Normal	**Light**	**Currently**	**Critical**	**Very Severe**	**Total**	**p-Value**
Not good	45	2	1	0	0	48	0.594
Good	79	1	0	1	0	81	
Total	**124**	**3**	**1**	**1**	**0**	**129**	
Nutritional Style	**Depression**						

Healthy food	Normal	Light	Currently	Critical	Very Severe	Total	p-Value
Not good	69	1	0	0	0	70	0.236
Good	56	3	0	0	0	59	
Total	**125**	**4**	**0**	**0**	**0**	**129**	
Nutritional Style Unhealthy Food	**Depression**						
	Normal	**Light**	**Currently**	**Critical**	**Very Severe**	**Total**	**p-Value**
Not good	46	2	0	0	0	48	0.594
Good	79	2	0	0	0	81	
Total	**125**	**4**	**0**	**0**	**0**	**129**	
2nd Measurement							
Nutritional Style Healthy food	**Anxiety**						
	Normal	**Light**	**Currently**	**Critical**	**Very Severe**	**Total**	**p-Value**
Not good	52	14	4	0	1	71	0.006
Good	30	15	9	4	0	58	
Total	**82**	**29**	**13**	**4**	**1**	**129**	
Nutritional Style Unhealthy Food	**Anxiety**						
	Normal	**Light**	**Currently**	**Critical**	**Very Severe**	**Total**	**p-Value**
Not good	28	13	6	2	0	71	0.395
Good	54	16	7	2	0	58	
Total	**82**	**29**	**13**	**4**	**0**	**129**	
Nutritional Style Healthy food	**Stress**						
	Normal	**Light**	**Currently**	**Critical**	**Very Severe**	**Total**	**p-Value**
Not good	69	2	0	0	0	71	0.298
Good	55	2	0	1	0	58	
Total	**124**	**4**	**0**	**1**	**0**	**129**	
Nutritional Style Unhealthy Food	**Stress**						
	Normal	**Light**	**Currently**	**Critical**	**Very Severe**	**Total**	**p-Value**
Not good	47	2	0	0	0	49	0.705
Good	77	2	0	1	0	80	
Total	**124**	**4**	**0**	**1**	**0**	**129**	
Nutritional Style Healthy food	**Depression**						
	Normal	**Light**	**Currently**	**Critical**	**Very Severe**	**Total**	**p-Value**
Not good	70	1	0	0	0	71	0.448
Good	56	2	0	0	0	58	
Total	**126**	**4**	**0**	**0**	**0**	**129**	
Nutritional Style Unhealthy Food	**Depression**						
	Normal	**Light**	**Currently**	**Critical**	**Very Severe**	**Total**	**p-Value**
Not good	48	1	0	0	0	49	0.868
Good	78	2	0	0	0	80	
Total	**126**	**3**	**0**	**0**	**0**	**129**	
3rd Measurement							
Nutritional Style Healthy food	**Anxiety**						
	Normal	**Light**	**Currently**	**Critical**	**Very Severe**	**Total**	**p-Value**
Not good	56	10	1	2	0	69	0.029
Good	38	14	5	3	0	60	
Total	**94**	**24**	**6**	**5**	**0**	**129**	

Nutritional Style Unhealthy Food	Anxiety						
	Normal	Light	Currently	Critical	Very Severe	Total	p-Value
Not good	33	12	2	2	0	49	0.530
Good	61	12	4	3	0	80	
Total	**94**	**24**	**6**	**5**	**0**	**129**	
Nutritional Style Healthy food	**Stress**						
	Normal	**Light**	**Currently**	**Critical**	**Very Severe**	**Total**	**p-Value**
Not good	66	3	0	0	0	69	0.489
Good	57	2	0	1	0	60	
Total	**123**	**5**	**0**	**1**	**0**	**129**	
Nutritional Style Unhealthy Food	**Stress**						
	Normal	**Light**	**Currently**	**Critical**	**Very Severe**	**Total**	**p-Value**
Not good	45	4	0	0	0	48	0.593
Good	78	1	0	1	0	81	
Total	**123**	**5**	**0**	**1**	**0**	**129**	
Nutritional Style Healthy food	**Depression**						
	Normal	**Light**	**Currently**	**Critical**	**Very Severe**	**Total**	**p-Value**
Not good	68	1	0	0	0	69	0.249
Good	57	3	0	0	0	60	
Total	**125**	**4**	**0**	**0**	**0**	**129**	
Nutritional Style Unhealthy Food	**Depression**						
	Normal	**Light**	**Currently**	**Critical**	**Very Severe**	**Total**	**p-Value**
Not good	48	1	0	0	0	49	0.590
Good	77	3	0	0	0	80	
Total	**125**	**4**	**0**	**0**	**0**	**129**	

The results of the analysis showed that there was a significant correlation between Nutritional Style and anxiety in preconception women in Tuban Regency, in the 1st measurement (p-value = 0.022), in the 2nd measurement (p-value = 0.006) and in the 3rd measurement (p-value = 0.029). However, there was no correlation between Nutritional Style and stress and depression.

Table 9. Multiple Logistic Regression Modeling of Nutritional Style Factors that Influence Mental Health (Anxiety) in Measurements 1, 2 and 3

1st measurement				
Variables	**Unstandardized Coefficients**		**p-Value**	**Exp (B)**
	B	**Std Error**		
Nutritional Style healthy food	0.344	0.168	0.043	2,047
Nutritional Style unhealthy food	0.099	0.172	0.568	573
Knowledge	0.216	0.220	0.328	981
Attitude	0.294	0.239	0.220	1.232
Constant	1,310	0.299	0,000	4.376
2nd measurement				
Variables	**Unstandardized Coefficients**		**p-Value**	**Exp (B)**
	B	**Std Error**		
Nutritional Style healthy food	0.415	0.157	0.009	2,641
Nutritional Style unhealthy food	0.003	0.161	0.986	18
Knowledge	0.246	0.204	0.229	1.209

Attitude	0.309	0.222	0.166	1,394
Constant	1.212	0.269	0,000	4,504
3rd measurement				
Variables	**Unstandardized Coefficients**		**p-Value**	**Exp (B)**
	B	**Std Error**		
Nutritional Style healthy food	0.291	0.136	0.035	2.136
Nutritional Style unhealthy food	0.020	0.140	0.884	146
Knowledge	0.142	0.182	0.435	783
Attitude	0.210	0.198	0.290	1,062
Constant	1.108	0.243	0,000	4,554

The results of the regression analysis showed that healthy food Nutritional Style had a significant effect on anxiety in preconception women in all measurements (p-value <0.05). Knowledge and attitude also had an effect on the 1st and 2nd measurements, but were not significant in the 3rd measurement. Healthy food Nutritional Style had an effect on anxiety with an Odds Ratio between 2,047 and 2,641, which means that women who have a healthy food Nutritional Style have a high chance of reducing their anxiety levels.

Table 10. Longitudinal Analysis of Changes in Nutritional Status and Mental Health

	Nutritional Status 2 and 1	Nutritional Status 3 and 1	Mental Health (Anxiety) 2nd and 1st	Mental Health (Anxiety) 3rd and 1st
Z	-2.333b	-3,000b	-2.121c	-4.452c
Asymp. Sig. (2-tailed)	.020	.003	.034	.000

Table 10 shows the results of significant changes in nutritional status and mental health with the optimization of Nutritional Style Pre-Conception including changes in nutritional status from the first measurement to the second measurement with a p-Value of 0.020 <0.05 and changes in nutritional status from the first measurement to the third measurement with a p-Value of 0.003 <0.05, which means that there is a Nutritional Style factor according to the regression analysis, namely that increasing pre-conception Nutritional Style knowledge makes pre-conception nutritional status normal.

There was a change in mental health (anxiety) from the first measurement to the second measurement with a p-Value of 0.034 <0.05 and a change in mental health (anxiety) from the first measurement to the third measurement with a p-Value of 0.000 <0.05. which means that there is a Nutritional Style factor according to the regression analysis, namely a good healthy food Nutritional Style further reduces anxiety disorders.

The correlation between Nutritional Style and nutritional status based on Body Mass Index and Anemia Incidence

Results this study shows that Nutritional Style (diet) during the preconception period has varying effects on nutritional status and anemia in preconception women. Correlation analysis shows that there is no significant correlation between Nutritional Style and BMI, but there is a significant correlation between healthy food Nutritional Style and the incidence of anemia in the measurement first (p-value 0.001) and in the second measurement (p-value 0.049). Logistic regression analysis showed that in the first measurement, knowledge about Nutritional Style had a significant effect on nutritional status, where women with less knowledge about Nutritional Style had a 2.093 times higher risk of experiencing abnormal nutritional status.

The theory supporting these findings suggests that nutritional status before and during pregnancy plays an important role in pregnancy readiness and fetal health. Mertinez Galiano et al (2020) explained that preconception nutrition has long-term effects on maternal and infant health, where unhealthy eating patterns can cause pregnancy complications and impaired fetal development. This study strengthens the view that preconception nutritional intake has a significant impact on maternal health conditions, especially in reducing the risk of anemia and abnormal nutritional status.

Macedo et al (2021) study emphasized the importance of managing diet during pregnancy, where 66.6% of pregnant women had a higher prevalence of overweight and obesity than the average. This emphasizes the importance of preconception nutrition education to prevent abnormal increases in nutritional status during pregnancy. The study also found that higher consumption of sweet foods in low-risk women, indicating the need for monitoring diet to ensure balanced nutritional intake.

In addition, a study by Aschauer et al (2021) showed that preconception micronutrient supplementation can increase spontaneous pregnancy rates in women of advanced reproductive age with unexplained infertility. These findings support the importance of adequate nutritional intake before pregnancy to improve pregnancy chances and reproductive health.

Researchers argue that healthy eating patterns and knowledge about Nutritional Style are essential to improve preconception health and pregnancy readiness. Focused preconception nutrition interventions, including education about healthy eating patterns and micronutrient supplementation, should be a priority to ensure optimal nutritional status, reduce the risk of anemia and increase the chances of a healthy pregnancy.

In this study, there was no significant correlation between Nutritional Style and nutritional status (BMI). This may be due to several factors, including good knowledge of Nutritional Style among preconception women. Most preconception women have good knowledge of Nutritional Style, which may contribute to a healthier diet although it does not always have a direct impact on improving nutritional status.

In line with research conducted by Paratmanitya (2012) which stated that there is a significant correlation between body image and nutritional status, some respondents in this study were prospective brides who may feel social pressure to achieve certain beauty standards that often focus on body shape and weight. This pressure can lead to unhealthy eating behaviors, such as excessively reducing calorie intake or having an unbalanced diet. This study was only conducted for three measurements. It may take a longer time to see a significant impact of Nutritional Style on nutritional status.

The correlation between Nutritional Style and mental health

This study shows that Nutritional Style (in this case a healthy diet) has a significant correlation with anxiety levels in preconception women, but not with stress and depression levels. This finding is interesting because not all aspects of mental health are influenced by Nutritional Style (healthy diet). This shows that mental health factors are also influenced by other factors, such as genetic factors, traumatic experiences, social support which may be more dominant in determining stress and depression levels in preconception women. Research conducted by Dennis et al (2022) strengthens this, showing that individuals with depression, anxiety, and comorbidities have many high-risk behaviors that affect health. These include poor eating habits, decreased physical activity, increased

use of addictive substances, and internet addiction. This shows that preconception mental health is influenced by more complex factors, not just Nutritional Style.

A meta-analysis conducted by Firth et al (2019) provides strong evidence for the effectiveness of dietary interventions in reducing depressive symptoms. The study found that dietary interventions had small to moderate positive effects on depressive symptoms, and these effects were more pronounced in women than men. The meta-analysis also showed that interventions conducted by professional dietitians had significant benefits for depression and anxiety.

These findings open up new perspectives on the complex correlation between diet and mental health. While Nutritional Style does not directly affect stress and depression, its significant impact on anxiety suggests that nutritional intake may play a role in maintaining emotional balance and supporting overall mental health. Therefore, considering Nutritional Style as one of the important aspects in maintaining health is very necessary. Comprehensive interventions, including improving diet, addressing psychosocial factors and social support may be an effective solution to overcome the various mental health challenges faced by preconception women. Therefore, collaboration between midwives, nutritionists, psychologists and other health workers is needed to provide integrated support during the preconception period. Through this collaborative effort, it is hoped that it can create an environment that is more supportive of preconception women to achieve optimal physical and mental well-being in building a healthy and happy family.

Changes in Nutritional Status and Mental Health

This study shows that optimizing Nutritional Style can significantly affect nutritional status and mental health during the preconception period. There is a significant increase in nutritional status from the first, second and third measurements. This is associated with an increase in preconception Nutritional Style knowledge, indicating that better knowledge of preconception nutrition contributes to more optimal nutritional status. In addition, there is a significant decrease in anxiety levels from the first, second and third measurements. The

decrease in anxiety is associated with the implementation of good healthy food Nutritional Style, a healthy diet helps reduce anxiety disorders.

The article from Role A Bekdash (2021) highlights the role of DNA methylation and the influence of diet on mental health throughout life. Epigenetic changes caused by consuming a healthy diet rich in micronutrients such as folate, choline and B vitamins have the potential to influence gene expression and may contribute to better mental health. This is in line with research findings that increased preconception Nutritional Style knowledge resulted in improved nutritional status and decreased anxiety, reflecting the importance of a quality diet to mental wellbeing.

A study by Sunita Taneja et al (2020) demonstrated the importance of comprehensive nutritional interventions during the preconception to early adolescence period in influencing child health outcomes and maternal nutritional status. This is relevant to the findings of this study, where the implementation of good Nutritional Style has been shown to improve nutritional status, which has the potential to have a positive impact on pregnancy readiness and mental health of preconception women.

Furthermore, O'Neil et al (2014) found that healthy eating patterns were consistently associated with better mental health in children and adolescents. This study supports the association between consuming a high-quality diet and reduced anxiety levels found in the current study. Hill et al (2019) also emphasized the importance of preconception diet in promoting optimal health and reducing the risk of complications during pregnancy.

A study by Firth et al (2019) found that dietary interventions can significantly reduce depressive symptoms, although their effect on anxiety is not large. This suggests that a proper nutritional approach can help reduce mental health symptoms, consistent with the results of this study showing a decrease in anxiety with the implementation of a healthy food Nutritional Style.

Cebrino et al (2021) highlighted that poor quality diet is a risk factor for CMD (Common Mental Disorders), supporting the findings of this study that healthy eating patterns are associated with better mental health in the preconception period. Bremer et al (2020) demonstrated the complex correlation

between diet, stress and mental health, reinforcing the importance of proper nutritional management in supporting mental health.

Overall, this study is in line with previous findings that optimal nutrition and good nutisyle implementation play an important role in improving nutritional status and mental health, which in turn can improve pregnancy readiness. The results of this study provide evidence that optimizing Nutritional Style during the preconception period not only has a positive impact on reducing anemia, but also improves mental health, especially in reducing anxiety levels. These findings strengthen the importance of nutritional interventions that focus on the preconception period.

The implementation of good Nutritional Style is not only by avoiding unhealthy foods, but also by understanding the body's nutritional needs and choosing foods that support overall health. Increasing knowledge about preconception nutrition is key in implementing a diet. A comprehensive education program involving prospective mothers, families and health workers must be a priority. By increasing awareness of the importance of preconception Nutritional Style, it will encourage the realization of a healthy and intelligent future generation.

The limitation of this study is that there was no direct observation of the food consumed by the respondents. This makes it difficult to control food intake in detail and potential bias in measuring eating patterns.

CONCLUSION AND SUGGESTION

There is no significant correlation between Nutritional Style and BMI, but there is a significant correlation between Nutritional Style healthy food and the incidence of anemia. There is significant correlation between Nutritional Style and mental health (anxiety) during the preconception period. Good Nutritional Style during preconception can improve nutritional status and minimize mental health risk. This suggests that optimizing Nutritional Style during the preconception period has great potential in improving pregnancy readiness. A nutritional intervention program focused on the preconception period is needed to improve knowledge and implementation of a healthy nutritional diet among

women during the preconception period. It is necessary to monitor the nutritional status and mental health of women during the preconception period regularly. Further research is needed over a longer period of time to see the long-term impact of optimizing Nutritional Style on maternal and fetal health.

DECLARATION

Conflict of Interest

There is no conflict of interest in this research.

Authors' Contribution

The lead researcher is responsible for the entire research, from planning, implementation, data analysis and dissemination of results. Research member 1 is responsible for data analysis and discussion. Research member 2 is responsible for respondent selection, data collection and discussion.

Ethical Approval

This research has been approved by the Research Ethics Board of the Nahdlatul Ulama Tuban Health Sciences Institute with the number 150/0084223523/LEPK.IIKNU/VI/2024

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