Original Article

Relationship Between Health Literacy and Maternal Bonding: A Prospective Cross-Sectional Study

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ABSTRACT

Background: Maternal bonding has an effect on the baby throughout its life. The effective and complete occurrence of the mother-baby bond depends on many factors which can be individual or environmental. Health literacy plays an important role in the health behaviors of individuals, the prevention of diseases, and the improvement of health. Health literacy is a key determinant of medical-related issues. **Objectives:** This study was conducted to examine the relationship between health literacy and mother-infant attachment in infancy. It was aimed to predict the biopsychosocial impact of the mother's health literacy level on the baby's life indirectly. **Materials and Methods:** The sample of this descriptive and cross-sectional study included 202 mothers. Data were collected using the Personal Information Form, Health Literacy Scale-Short Form (HLS-SF), and Maternal Attachment Inventory (MAI). **Results:** There were no statistical correlations between HLS-SF scores and MAI scores. In addition, the mothers with a statistically significant higher MAI score were those whose partners had a higher education level, had a planned pregnancy, worked in the prenatal period, never breastfed, and had earlier skin-to-skin contact with their baby. ($P < 0.05$). **Conclusion:** Factors that may affect maternal bonding, which affects a baby's entire life, should be addressed by the authorities and necessary improvements would be useful. We believe that this previously unexplored study will pave the way for multicenter similar studies.

KEYWORDS: *Health literacy, maternal bonding, mother-infant attachment*

INTRODUCTION

The bonding style, which is a draft for all the relationships established by a person during his/her life starting from the mother and child relationship, may be decisive even in the relationships established between the person and the treatment team in chronic disease situations.[1] A maternal bond is defined as the presence of a warm, continuous, and close relationship between the mother and the child and as the satisfaction and pleasure of both parties due to this relationship. The maternal bond provides the child's healthy growth and development and positively affects his/her life.[2] After the child's first attachment experience is formed as safe or unsafe, it will continue for a lifetime. If safe bonding does not occur, the child may experience problems in social, mental, and emotional development since infancy.[3]

The effective and complete occurrence of the mother-baby bond depends on many factors. These factors can be individual or environmental.[4] Factors such as watching and feeling the fetal movements, listening to music, education during the pregnancy, massaging the baby after birth, support of the family to the mother, and skin contact between the mother and the baby has positive effects on the occurrence of this bond.[5] On the other hand, if the mother goes through depression, becomes lonely, cannot receive support from people around her, stays away from her baby, or if there is a situation of unwanted pregnancy, these factors may

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hurt the mother and baby bond.[6] It has been shown in the literature that there may be disruption in the bonding process due to such factors.[7]

Health literacy is the capacity to obtain, interpret and use fundamental health information and services in terms of protection and improvement of the individual's health, and treatment in case of deterioration of one's own health.[8] Health literacy is a key determinant of health-related issues. Together with environmental and genetic factors, health literacy plays an important role in the health behaviors of individuals, the prevention of diseases, and the improvement of health. Health literacy was born from many social, personal, and cognitive skills as well as the literacy skills required for the health system.[9] Health literacy also plays an important role in the management of chronic diseases by individuals themselves.[10] It was stated that there is a significant relationship between low health literacy and the implementation of medical instructions, the interpretation of health messages, and worse general health situations. It was also stated that health literacy also affects other health outcomes such as compliance with the treatment, self-efficiency, smoking and alcoholism, examination of prescription details, the prevalence of chronic diseases, asthma severity and control, diabetes control and related symptoms, hypertension control, quality of life and prices.[11] While individuals with low levels of health literacy are less likely to be involved in screening and prevention interventions such as having pap smears, getting mammography, or being vaccinated against influenza, they are more likely to experience advanced prostate and breast cancer.[12] In addition, unhealthy behaviors such as smoking, breastfeeding less, and having less information about contraception are common in these people.[13]

It was aimed this study to determine the effect of health literacy on maternal bonding, which was not examined in the literature research. Thus, it was tried to predict the biopsychosocial impact of the mother's health literacy level on the baby's life indirectly.

MATERIALS AND METHODS

Design

Planned in prospective, descriptive, and cross-sectional type, this study was conducted between 5.10.2022 – 6.10.2022 with healthy mothers who had a baby between 6-12 months of age and came to ***** Family Health Center for any reason.

In the study, which was planned to last for 1 month, the average number of mothers that a family doctor could examine during this period was calculated as 200. Accordingly, it should be aimed to reach a minimum of

72 mothers with a 95% confidence interval and a 5% margin of error.

Local clinical research ethics committee approval was obtained for this study.

Participants

Women who were literate, over the age of 18, gave birth to a healthy baby at or after 37 weeks of pregnancy, and had no known cognitive impairment or disability were included in the study. An informed consent form was obtained from the participants.

The information obtained from the mothers was collected under three main titles: Personal Information Form, Health Literacy Scale-Short Form (HLS-SF), and Maternal Attachment Inventory (MAI). The validity of both scales has been proven by conducting validation studies.[3,14]

Health Literacy Scale-Short Form includes 4-point Likert-type answer options varying between 1 (very difficult) to 4 (very easy) and consists of 12 items. The formula (Index = (Average-1) × 50/3) is used to evaluate the scale. The average is calculated by dividing the total score of the scale by the number of items on the scale. The index value calculated by the formula ranges between 0-50, the higher score indicates better health literacy.

The Maternal Attachment Inventory, on the other hand, measures maternal emotions and behaviors. Since it is a scale applied by the person himself/herself, it is a scale that can be applied to literate women who can understand what she is reading. This index includes 26 items with a 4-point Likert scale varying between "always" and "never". Each item contains direct statements and Always is calculated as (a)=4 points, Frequently as (b)=3 points, Sometimes as (c)=2 points, and Never as (d)=1 point. An overall score is obtained from the sum of all items. A high score indicates that maternal bonding is high. The lowest score to be obtained from the scale is 26 and the highest score is 104. The scale does not have a cutoff score.

In the personal information form, diabetes, hypertension, miscarriage threat, and preterm birth threat were questioned as health problems throughout pregnancy.

Statistical analysis

Data in the information form and the total scores of MAI and HLS-SF were taken as variables. The data obtained from the study were evaluated in a computer environment using the SPSS 22.0 package program. The normality of the variables was evaluated by the

Shapiro-Wilk test. Since the variables did not show normal distribution, the Mann Whitney U test was used to examine the differences in the means between the two categories, and the Kruskall-Wallis test was used to compare the means of the variables between more than two categories. In order to determine the variable that makes the difference in the analyses made with Kruskall Wallis, an advanced Mann-Whitney U test was used in binary groups. Since the data were not normally distributed, the data representation was made as median (minimum, maximum). Interquartile Range values were calculated for MAI (11) and HLS-SF (7). The relationship between the scales that do not have a normal distribution was examined by Spearman correlation analysis. The significance level was taken as $P < 0.05$.

RESULTS

The ages of 202 mothers who met the criteria and were included in the study were examined in 3 groups. The number of people between the ages of 19-25 was 53 (26.2%), between the ages of 26-35 was 122 (60.4%), and over the age of 35 was 27 (13.4%). Looking at their level of education, 87 of the mothers (43.1%) were in the group of university graduates and above. Similarly, partners (n:200) 90 of them (45%) were in the group of university graduates and above. 96.9% of the mothers' partners (n:197) were working, while 6% did not have a job.

There were statistically significant differences between partner education levels and maternal bonding scores between the secondary-high

Table 1: Comparison of MAI and HLS-SF with mother's socio-demographic characteristics (*n*=201)		MAI		HLS-SF	
	n (%)	Median (min-max)	*P*	Median (min-max)	*P*
Age* (years)					
19-25	53 (26.2)	101 (79-104)	0.447	36 (22-48)	0.803
26-35	122 (60.4)	101 (78-104)		36 (18-48)	
>35	27 (13.4)	99 (76-104)		37 (24-48)	
Educational level*					
Literate	3 (1.5)	99 (89-104)	0.124	34 (25-34)	0.137
Primary school	15 (7.4)	100 (76-104)		36 (24-43)	
Middle School	38 (18.8)	98 (80-104)		36 (18-48)	
High school	59 (29.2)	101 (79-104)		36 (22-48)	
University/above	87 (43.1)	102 (78-104)		36 (21-48)	
Partner's educational level* *n*=200					
Literate	2 (1)	94 (89-99)	0.002	29.5 (25-34)	0.258
Primary school	12 (6)	98.5 (76-104)		35.5 (24-46)	
Middle School	35 (17.5)	89 (82-104)		36 (18-48)	
High school	61 (30.5)	101 (79-104)		36 (21-48)	
University/above	90 (45)	102 (78-104)		36 (22-48)	
Partner's working status *n*=197					
Yes	191 (96.9)	101 (76-104)	0.633	36 (18-48)	0.443
No	6 (3.1)	103 (87-104)		35 (26-48)	
Family Type					
Nuclear	188 (93.1)	101 (76-104)	0.057	36 (18-48)	0.08
Extended	14 (6.9)	88.5 (78-104)		38.5 (24-46)	
Were you working before giving birth?**					
Yes	89 (44.1)	102 (86-104)	0.004	36 (23-48)	0.563
No	113 (55.9)	100 (76-104)		36 (18-48)	
Working status**					
Yes	39 (19.3)	103 (86-104)	0.141	36 (27-48)	0.118
No	163 (80.7)	101 (76-104)		36 (18-48)	
Number of living children*					
1	95 (47)	101 (78-104)	0.279	36 (21-48)	0.529
2	52 (25.7)	102 (82-104)		36 (22-48)	
3	37 (18.3)	101 (76-104)		36 (18-46)	
4	16 (7.9)	95.5 (78-104)		35.5 (24-48)	
5	2 (1.0)	102 (100-104)		32.5 (26-39)	

*Kruskall Wallis test, **Mann Whitney *U* test. *n*: Number of people. MAI: Maternal Attachment Inventory Score. HLS-SF: Health Literacy Short Form Score

Table 2: Comparison of maternal health characteristics of MAI and HLS-SF in the perinatal period

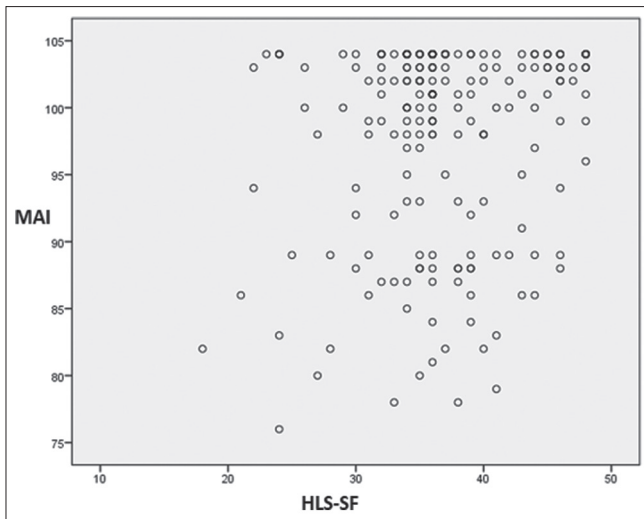|	n (%)	MAI		HLS-SF	
		Median (min-max)	P	Median (min-max)	P
Did you have any mental problems before pregnancy					
Yes	21 (10.4)	100 (86-104)	0.341	38 (21-48)	0.188
No	181 (89.6)	101 (76-104)		36 (18-48)	
Was the pregnancy planned					
Yes	161 (79.7)	101 (76-104)	0.036	36 (21-48)	0.732
No	41 (20.3)	99 (78-104)		36 (18-48)	
Did you have any health problems during pregnancy					
Yes	91 (45)	101 (78-104)	0.497	36 (22-48)	0.641
No	111 (55)	101 (76-104)		36 (18-48)	
Fear of childbirth					
Yes	135 (66.8)	101 (76-104)	0.81	36 (21-48)	0.392
No	67 (33.2)	101 (80-104)		36 (18-48)	
Did you have any problems during childbirth					
Yes	36 (17.8)	101.5 (80-104)	0.54	36 (27-48)	0.436
No	166 (82.2)	101 (76-104)		36 (18-48)	
Type of birth					
Naturel	71 (35.1)	99 (76-104)	0.026	36 (18-48)	0.52
Caesarean	131 (64.9)	101 (78-104)		36 (22-48)	

Mann Whitney *U* test. *n*: Number of people. MAI: Maternal Attachment Inventory Score. HLS-SF: Health Literacy Short Form Score

Table 3: Comparison of MAI and HLS-SF with infant characteristics

	n (%)	MAI		HLS-SF	
		Median (min-max)	P	Median (min-max)	P
Baby gender**					
Male	88 (43.6)	101 (82-104)	0.346	37.5 (21-48)	0.046
Female	114 (56.4)	101 (76-104)		36 (18-48)	
Baby's birth weight (gram)*					
<2500	4 (2)	103.5 (101-104)	0.229	43 (22-48)	0.202
2500-4000	190 (94.1)	101 (76-104)		36 (18-48)	
>4000	8 (4)	100.5 (82-104)		33.5 (28-46)	
Your current breastfeeding status**					
Yes	153 (75.7)	101 (78-104)	0.886	36 (18-48)	0.403
No	49 (24.3)	101 (76-104)		36 (21-48)	
When did you first breastfeed*					
Never	6 (3.0)	104 (102-104)	0.015	42.5 (23-48)	0.228
First day	52 (25.7)	100 (78-104)		36 (24-47)	
First half hour	116 (57.4)	101 (76-104)		36 (18-48)	
Next days	28 (13.9)	102 (88-104)		36 (22-48)	
When was the first skin tie after birth*					
First day	46 (2.8)	99.5 (78-104)	0.017	36 (25-47)	0.468
First half hour	139 (68.8)	101 (76-104)		36 (18-48)	
Next days	17 (8.4)	103 (88-104)		39 (22-48)	
Has the baby been hospitalized**					
Yes	40 (19.8)	101.5 (80-104)	0.171	36 (22-48)	0.953
No	162 (80.2)	101 (76-104)		36 (18-48)	

*Kruskall Wallis test. **Mann Whitney *U* test. *n*: Number of people. MAI: Maternal Attachment Inventory Score. HLS-SF: Health Literacy Short Form Score

school, secondary-university (or above), and high school-university (or above) graduates. (*P* < 0.05) [Table 1].

Although there was no statistically significant difference in the health literacy levels between those with planned pregnancy and those with the natural

Figure 1: Scatter's test. MAI: Maternal Attachment Inventory HLS-SF: Health Literacy Score – Short Form

Table 4: Correlation assessment between MAI and HLS-SF scores correlations

	MAI	HLS-SF
Spearman's rho		
MAI		
Correlation Coefficient	1.000	0.115
Sig. (2-tailed)	.	0.104
n	202	202
HLS-SF		
Correlation Coefficient	0.115	1.000
Sig. (2-tailed)	0.104	.
n	202	202

n: Number of people. MAI: Maternal Attachment Inventory Score. HLS-SF: Health Literacy Short Form Score (Spearmans's rho=0.115, *P*=0.104)

delivery method, their maternal bonding levels were measured as higher and found to be statistically significant (*P* < 0.05) [Table 2].

While the health literacy levels of the mothers with male babies were statistically significantly higher (*P* = 0.046), there was no difference between MAI scores. MAI scores of those who never breastfeed were found to be significantly higher than those who breastfed in the first half-hour and on the first day (*P* = 0.015). There was a significant difference in terms of first skin contact duration and maternal bonding scores between the first day and the next days (*P* = 0.017) [Table 3].

When MAI and HLS-SF scales were applied to all participants, they did not show the normal distribution, and no statistically significant correlation was observed between the two scales. (Spearmans's rho = 0.115, *P* = 0.104) [Figure 1 and Table 4].

DISCUSSION

The relationship between the factors in the perinatal periods and the level of health literacy with the mother's bonding with her child was examined in this study.

Although many studies have been conducted about health literacy levels, the mother and baby's bonding has not been examined.[13,15-18] Although the level of health literacy is very effective in the personal medical life, the correlation with the level of mother-infant attachment, which will have a significant effect on the mental health of the baby, was not found in this study.

A high level of education is expected to affect the person in terms of reading the behaviors of the baby and increasing knowledge and skills in caring for the baby. In the study conducted by Durualp *et al.*,[19] it was shown that mother-baby bonding increased as the education levels of the partners increased. Both mothers and fathers were examined in the study conducted by Ruiz *et al.*[16] on parent-baby bonding, and no relationship was found between the education level of the father and the mother-baby bonding. In our study, we found no relationship between the education level of mothers and maternal bonding. This finding indicates that the mother's education level is ineffective in attachment. However, it was observed that a higher level of partner education had a positive effect on maternal bonding scores. This suggests that the partner's level of education will increase the mother's trust in her partner and thus, allow her to interact more positively with her baby.

There are also different perspectives on when a mother's employment is more likely to affect the bonding process between mother and child. In our study, the maternal bonding level of mothers who worked before giving birth was found to be higher than that of mothers who did not. On the other hand, there was no significant difference between the maternal bonding levels of the mothers who worked after birth and those who did not. There are studies showing that maternal bonding of working mothers is more[19] and that it is less.[17] This may have been due to the level of education of working mothers and the confidence provided by their economic income.

In our study, maternal bonding levels were measured as higher in those with a planned pregnancy. There are also studies that state-planned pregnancy does not affect maternal bonding.[18,19] On the other hand, similar to our study, there are many studies that suggest that mothers with a planned pregnancy have a higher level of maternal attachment.[1,20-22] The reason for this situation may be that mothers with a planned pregnancy feel

more ready for motherhood and that they want to have a baby more.

Maternal bonding levels were measured higher in those who had a normal delivery. There are studies supporting our data.[22,23] Although it is believed that the reason for this is the factors that will allow the hormones that support maternal motives such as oxytocin to be secreted earlier with normal childbirth, it should also be noted that there are a lot of studies that have not found a relationship between the mode of delivery and maternal bonding.[1,24,25]

While there are studies that have not found a relationship between breastfeeding time and maternal bonding,[24] many studies indicate that breastfeeding as soon as possible will have a positive effect on maternal bonding.[26] In our study, contrary to what was expected, MAI scores of those who never breastfeed were found to be significantly higher than those who breastfed in the first half-hour and on the first day. The fact that the study was conducted with mothers with babies older than 6 months suggested that more different and dominant factors may have developed over time. However, we were in a dilemma in this opinion, as we found that mothers with shorter first skin contact times had higher MAI scores.

In this study, in terms of the relationship between the first skin contact after childbirth and maternal bonding scores, maternal bonding levels of those who had skin contact on the first day were found to be higher than those who had skin contact the next days. Many studies report that mother-baby skin contact will positively affect maternal bonding, thus recommending that mothers take their baby in their arms as soon as possible after birth and keep the contact time they spend together long. There are even studies suggesting carrying the baby like a kangaroo.[27,28] Immediate skin contact may cause this result due to the endocrine effect.

CONCLUSION

It is known that maternal bonding has an effect on the baby throughout its life. We examined the relationship between this issue and health literacy in this study since this must be reviewed in detail. It is obvious that healthy individuals are necessary to form healthy societies. One of the most important steps to be taken in this regard is to support the healthy upbringing of babies who have just opened their eyes to the world. In addition to well-educated and experienced health professionals, patient compliance and education level are also important. It is important for preventive medicine that health professionals provide the right education and information, as well as the examination and treatment

carried out in hospitals, and family health centers, which are application centers for pre-pregnancy, prenatal and postnatal care. We believe that this study will pave the way for the multi-centered conduction of similar studies.

Limitations

There are some limitations to the research. The first limitation is that this study was conducted in a single city and on a family health center basis. The fact that this study was conducted in a single center may have reduced its social, economic, and cultural diversity. Another limitation is that the data collection form was self-reported by the participating mother.

Key messages

- Maternal bonding has an effect on the baby throughout his/her life.
- Partner education levels, mothers' work status when pregnant, and skin contact time were related to the MAI score.
- Health literacy and maternal bonding scores did not correlate in this study.

Ethical approval

Gaziantep University Faculty of Medicine Clinical Research Ethics Committee Approval was obtained for this study on 3.9.2022 with registration No. 2022-91. Necessary permissions were obtained from Scientific Research Application Review Commission in Gaziantep Provincial Health Directorate on 5.10.2022 with decision number: 98.

Declaration of patient consent

An informed consent form was obtained from all participants in the study, which allowed the processing of their data for scientific research purposes.

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Nil.

Conflicts of interest

There are no conflicts of interest.

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