# Knowledge and Intention of breast-milk Storage: the Moderating role of Internal Locus of Control

**Yeon Ran Hong, Eunyoung Do**

***Abstract Background/Objectives:*** ***This study was to examine the female college students' knowledge and intent of implement related to breast-milk storage according to internal breast-milk storage locus of control***

***Methods/Statistical analysis:*** ***This study is a research study applying a cross-sectional design using a structured questionnaire. The subjects of the study were 485 nursing school students in 2 cities in Korea. Data were collected after explaining the content of structured questionnaires and the purpose of this study. Collected data were analyzed by descriptive statistics and, Pearson's correlation coefficient and regression analysis through the SPSS 23.0 version***

***Findings:*** ***Students with high level of knowledge report significantly higher levels of Intention of Implement. Relationship became significant with the addition of interaction terms in step3. It means that there is a moderating effect of internal locus of control on relationship between knowledge and intention of implement (β = .185, p <.001). Results showed that three steps were significant (p <.001) and the explanatory power of the variables was 86.1%.***

***Improvements/Applications:*** ***To improve the intention to implement breast milk storage, it is necessary to develop an education program to provide information about storage. Also, effective cognitive approach to increase internal locus of control is needed that can change wrong behavior and emotions***

***Keywords: Breast, Milk, Breastfeeding, Storage, Locus of Control, Intention***

## I.INTRODUCTION

Feeding Breast milk is a major concern of the public and deciding on breastfeeding contributes to the health of infants, development and motherhood. Absolute Breastfeeding is a physiologically appropriate approach to nutrition during the first half of the infant stage[1]. Commercialized formulas include baby constipation, infection, and the risk of long-term diseases such as adult diseases and cancer when a baby grows up [2].Studies have explained the decrease in maternal complications and reproductive organ cancer. For a baby, the health benefits of breastfeeding include the reduction of respiratory diseases and the development of intelligence. [3][4]. Considering the fact that breast milk is the most optimal source of nutrients and an unmatched source of indispensable anti-microbial and other protective substances, the need to store breast milk for at least limited periods of time is unavoidable in a neonatal unit taking care of sick babies [5].

Regardless of the findings of the above breast-feeding related research and evidence of national priorities on this topic, Korea maintains a relatively low breast-feeding rate compared to developed country. For example, Germany and Italy had initial breastfeeding rates of96% and 89%, each[6] , compared to57.2% in the Korea. Breastfeeding rates 6 months post-partum were 48%, 62%, and 18.3% for Germany, Italy, and Korea, each[7].

The central concept of locus-of-control theory is that individuals differ in the extent to which they attribute reinforcement to their own (internal) or outside (external) forces. People with the inner locus of control know that their actions produce the result of their lives and believe that they can change his or her destiny by changing their behavior. Locus of control was utilized as a moderator variable in investigating the relationship between intention to achieve and several dependent variables[8].

There are many obstacles that make it difficult for mothers to start or maintain breastfeeding. In particular, mothers who work full-time were less likely to continue breastfeeding than mothers who worked part-time. [9]. Aswomen are rating breastfeeding as important and having a belief that babies should be breastfed at least for some time, Education may have accounted for statistically significant associations in breastfeeding perceptions.[10,11].

Given these facts, one's beliefs, especially the internal locus of control can be understood as a very important factor in implementation as well as knowledge. To the best of our knowledge, there are no studies that examine the relationship between knowledge and intent of implement related to breast-milk storage according to internal breast-milk storage locus of control as a moderating factor.

A number of enabling factors should be taken into consideration when planning interventions to increase breastfeeding practices. Therefore, this study was conducted to provide basic data on the establishment of education and cognitive programs for the success of exclusive breastfeeding.

## II.METHODS

### 2.1. *Study design and sample*

This study is a research study applying a cross-sectional design using a structured questionnaire.

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**Yeon Ran Hong,** Associate professor, Dept. of Nursing, Sunchon National University, 255 Jungang-no, Jeollanam-do, 57922, Rep of KOREA.

**Eunyoung Do** Associate professor, Dept. of Nursing, Kwangju Women's University, 165Sanjung-dong, Gwangsan-gu,Gwangju, Jeollanam-do, 62396, Rep of KOREA. corresponding author

E-mail :eydo@kwu.ac.kr

The subjects of the study were 485 nursing school students in 2 cities in Korea. Data were collected after explaining the content of structured questionnaires and the purpose of this study. Collected data was analyzed by descriptive statistics and, Pearson's correlation coefficient and regression analysis through the SPSS 23.0 version.

### 2.2. Instruments

The tools in this study consist of general characteristics breast milk storage knowledge, Intention to implement breast milk storage and Internal locus of control to breast milk storage. The general characteristics are seven questions, including Class year, Family type,Smoking experience, Religion, Monthly Family income, Information for Breast milk storageand Ideal education time for breast milk storage,Breast-milk storage knowledge, internal breast milk storage behavior locus of control and intention to implement breast milk storage wascomposed of 20, 5, 3 questions respectively. These tools are consisted of self-reported 5-point scale. Each answer was rated from 1 to 5 point. The reliability of these each tools was chronbach's α= .80, chronbach's =.83 andchronbach's =.86in this study.

The breast-milk storage knowledge tool was developed using the three-round delphi method by four pediatricians and four obstetrics specialists from obstetrics and obstetrics. Intention to implement breast milk storage and Internal locus of control to breast milk storage tool is organized by two nursing professors.

The higher the score, the more positive they are.

## III.RESULTS

### General characteristics of the subjects

Table 1 lists the general characteristics of the subjects. In this study, 32.4% were sophomore. Nuclear family accounted for 79.2%. 94% of subjects didn't have smoking experience. 50.5% of subjects had no religion. The proportion of household income per month over five million won was 27.0%. Information for Breast milk storage was 28.7% from broadcasting. 34.8%% of the participants answered "Around childbirth" was an ideal education time for breast milk storage.

**Table 1. General characteristics of the subjects (N=485)**

| | Variables | N | % |
|---|---|---|---|
| Class year | Freshman | 111 | 22.9 |
| | Sophomore | 157 | 32.4 |
| | Junior | 115 | 23.7 |
| | Senior | 102 | 21.0 |
| Family type | Large family | 33 | 6.8 |
| | Nuclear family | 384 | 79.2 |
| | Lone father | 50 | 10.3 |
| | Lone mother | 6 | 1.2 |
| | Grandparents only | 2 | .4 |
| | Others | 10 | 2.1 |
| Smoking experience | Smoking in the past | 17 | 3.5 |
| | Currently smoking | 12 | 2.5 |
| | No smoking | 456 | 94.0 |
| Religion | Yes | 240 | 49.5 |
| | No | 245 | 50.5 |
| Monthly Family income (10,000won) | ≧500 | 131 | 27.0 |
| | 400-499 | 87 | 17.9 |
| | 300-399 | 129 | 26.6 |
| | 200-299 | 90 | 18.6 |
| | <200 | 48 | 9.9 |
| Information for Breast milk storage from | Newspapers, magazines | 40 | 8.2 |
| | Broadcasting | 139 | 28.7 |
| | Books | 19 | 3.9 |
| | Friends | 4 | .8 |
| | Nursing-related classes | 118 | 24.3 |
| | Internet | 32 | 6.6 |
| | Others | 39 | 8.0 |
| | No | 94 | 19.4 |
| Ideal education time for breast milk storage | Primary to high school | 126 | 26.0 |
| | College | 114 | 23.5 |
| | Before Marriage | 76 | 15.7 |
| | Around childbirth | 169 | 34.8 |

**Knowledge for Breast milk storage, Internal breast milk storage behavior locus of control, Intention to implement breast milk storage**

As shown in Table 2, Table3 & Table4,the average score of"Knowledge for Breast milk storage"was 11.80 out of 20 points, demonstrating rather poor understanding of breast milk storage.Internal breast milk storage behavior locus of control was 17.95 out of 25 points and "Intention to implement breast milk storage" was 10.91 on average out of 15 points.

**Table 2. Knowledge for Breast milk storage (N=485)**

| Contents | M(SD) | |
|---|---|---|
| 1. Wash hands thoroughly before milking and clean breast to the nipple and areola. | .96 | .204 |
| 2. A warm, gentle massage before milking for a few minutes is helpful | .95 | .225 |
| 3. Use a glass or hard plastic container with a lid under the breast for breast milk storage | .30 | .460 |
| 4. Squeeze the breast gently using the thumb and other fingers and then release. Repeat rhythmically. | .76 | .424 |
| 5. Write the date on the reservoir and write the name of the baby when the breast milk is left to a health professional for keeping and feeding. | .88 | .330 |
| 6. The breast pump needs to be washed with soap and water and dried after each use. | .56 | .496 |
| 7. The breast pump needs to be kept clean and stored in bags or containers with a cover | .81 | .394 |



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|---|---|---|
| 8. The breast milk containers must be sterilized | .89 | .312 |
| 9. Milking can be done either by hand or using a breast pump | .84 | .601 |
| 10. The first few drops of milk need to be discarded during milking | .48 | .500 |
| 11. Fresh breast milk may be stored for 3-4 hours at 19 ~ 26 ℃ | .36 | .486 |
| 12. Fresh breast milk may be stored up to 72 hours at below 4 ℃. | .38 | .490 |
| 13. For easy access, breast milk may be kept on the door side of a refrigerator. | .21 | .409 |
| 14. Fresh breast milk can be stored at least for 24 hours at a temperature below -4 ℃ . | .25 | .436 |
| 15. The containers for frozen storage of breast milk should not be completely filled due to the expansion during freezing. | .63 | .483 |
| 16. Thawed milk can be kept for up to two hours at 16 ~ 29 ℃. | .34 | .475 |
| 17. Breast milk thawed inside a refrigerator can be kept for up to 24 hours from the moment being thawed in the refrigerator. | .34 | .474 |
| 18.Once the breast milk is thawed, it cannot be re-frozen. | .59 | .493 |
| 19. All stored breast milk must have the date of storage and the oldest one should be used first. | .71 | .453 |
| 20. Fresh frozen breast milk should not be thawed in a microwave oven or a gas oven. | .54 | .499 |
| Total | 11.80 | 4.54 |

**Table 3. Internal breast milk storage behavior locus of control (N=485)**

| Items | M | SD |
|---|---|---|
| 1 Putting the breast milk storage in action depends on the willingness of women in spite of acknowledging the difficulties. | 3.74 | .852 |
| 2. Putting the breast milk storage in action depends on the willingness of women in spite of physical difficulties. | 3.52 | .931 |
| 3. Putting the breast milk storage in action depends on the willingness of women even in the case of working women. | 3.66 | .858 |
| 4. Putting the breast milk storage in action depends on the willingness of women even in the case of going out and traveling long time. | 3.69 | .815 |
| 5. I am sure that I can do breast milk storage in the case of my own childbirth. | 3.35 | .867 |
| Total | 17.95 | 3.39 |

**Table 4. Intention to implement breast milk storage (N=485)**

| Items | M | SD |
|---|---|---|
| 1.How strongly do you intend to do breast milk storage for breastfeeding after your own childbirth? | 3.69 | .904 |
| 2. How strongly do you intend to do breast milk storage for breastfeeding in the case that you have a job? | 3.60 | .861 |
| 3. How strongly do you intend to do breast milk storage for breastfeeding in the case that you are traveling or going out for a long time? | 3.63 | .806 |
| Total | 10.91 | 2.29 |

**Correlation between knowledge, Internallocus of control and Intention of Implement**

Table 5 shows the relationship betweenIntention of Implementand variables. The correlation between the knowledge of breast milk storage and the attitude toward breast milk storage was analyzed to be positive by Pearson's correlation analysis with ($r = .237$, $p < .001$). Higher level of knowledge ($r = .333$, $p < .001$) and Higher level of Internal locus of control($r = .433$, $p < .001$) were associated with higher Intention of Implement.

**Table 5. Correlation between knowledge, Internal locus of control and Intention of Implement (N=485)**

| | Knowledge for Breast milk storage | Internal locus of control | Intention of Implement |
|---|---|---|---|
| Knowledge of breast milk storage | 1 | .237** | .333** |
| Internal locus of control | .237** | 1 | .433** |
| Intent of Implement | .333** | .433** | 1 |

** $p < 0.001$

**Regression table showing moderating effects of Internal breast milk storage behavior locus of control**

Aim of the study was to test for the moderating effect of the internal locus of control on the relationship between knowledge and intention of implement. Table 6 shows only the direct and the moderating effect of internal


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locus of control. Results show students with high level of knowledge to report significantly higher levels of Intention of Implement. Relationship became significant with the addition of interaction terms in step3. It means that there is a moderating effect of internal locus of control on relationship between knowledge and intention of implement (β = .185, p <.001). The analysis results showed that three steps were significant (p= 0.000) and the explanatory power of the variables was 86.1%.

**Table 6. Regression table showing moderating effects of internal locus of control (N=485)**

| | Step1 | | | | | Step2 | | | | | Step 3 | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | B | SE | β | t | p | B | SE | β | t | p | B | SE | β | t | p |
| constant | 8.910 | .277 | | 32.189 | .000 | 4.807 | .511 | | 9.406 | .000 | 9.660 | .244 | | 39.598 | .000 |
| Knowledge(a) | .169 | .022 | .333 | 7.754 | .000 | .126 | .021 | .248 | 6.082 | .000 | .734 | .021 | 1.444 | 35.435 | .000 |
| Locus of control(b) | | | | | | .257 | .028 | .377 | 9.265 | .000 | .018 | .013 | .027 | 1.415 | .158 |
| a*b | | | | | | | | | | | .072 | .002 | 1.967 | 45.971 | .000 |
| R2(Adj R2) | .111(.109) | | | | | .246(.243) | | | | | .861(.860) | | | | |
| △R2 | .615( $p <$ .000) | | | | | | | | | | | | | | |
| Durbin-Watson | 1.741 | | | | | | | | | | | | | | |
| F | 60.125($p <$ .000) | | | | | 85.840($p <$ .000) | | | | | 2113.378($p <$ .000) | | | | |

## IV.DISCUSSION

Results of this study indicated a main effect of knowledge and an interaction effect of knowledge and Internal breast milk storage behavior locus of control. The more she or he knows, the more she/he has intention to carry out breast milk storage. In step 2, when Internal breast milk storage behavior locus of control is injected as aindependent variable.In the end, moderating effect of Internal breast milk storage behavior locus of control on the relationship knowledge and intention to implement breast milk storage is significant and obvious.

The score of knowledge level of the subjects about breast milk storage was 11.80 ± 4.54out of 20 point scale, a little higher than the median value of 10. Few previous studies exist on the storage of breast milk that directly compare the results of current studies.

Economic constraints force large numbers of women to return to work while still breastfeeding their infants. The ability, that is to say knowledge, to express and store breast milk for later feeding, when away from the infant, might strongly influence mothers' decision to continue breastfeeding even after they have returned to work[12]. In this respect, breast milk storage knowledge is considered to be a very important element toimplement storage for absolute breastfeeding and the results of this study can be seen as evidence.

Among the 20 questions related to breast milk storage, the correct answer rate for "NO 13. For easy access, breast milk may be kept on the door side of a refrigerator" was the lowest.The need for education on overall breast milk storageknowledge has been demonstrated by the results of this study, but it should be focused on education on knowledge, particularly in relation to statements with high rates of error.

A study shows a considerable difference betweenfirst-time pregnant women's intention to exclusively breastfeed(70%) and their actual rate of exclusivebreastfeeding 1 week after (50%). These declining tendency between intention and behavior represent a huge lost opportunity to encourage and support breastfeeding. Experiencing hospital practices that inhibitabsolute breastfeeding (providing commercial milk formula) was significantly prevented mother from practicing their intention to absolute breastfeeding[13].

On the other hand, factors related to the past breastfeeding experience in which women are raised as babies and others around them provide breast milk to their children are positively correlated with the beginning and maintenance of breastfeeding.

[14]. Studies explain that mothers often decide how to nourish their children before they become pregnant[

15].Thus, the intent of breastfeeding can be identified as an important factor in the onset of breastfeeding and storage of breast milk.

.[16].Several previous studies have explained that relevant variables of breast-feeding behavior and breast-feeding behavior are determined before conception. Therefore, it may be most effective to intervene to encourage breastfeeding when women are single.



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It is similar to our research that women with a strong will and receptive attitude to breastfeeding behavior are more likely to start breast-feeding than women with lower level of intent and attitude [17].

Therefore, this study makes a significant contribution by suggesting that efforts by health professionals to enhance their willingness to breastfeed should be centered as much as consideration of social norms, health and economic benefits associated with breastfeeding in women. In addition, the finding also suggests that increased willpower, receptive attitudes, and breastfeeding storage knowledge for maintain breastfeeding can lead to an increase in the start of breastfeeding and the maintenance rate. Evidence is growing for the important role of emotional and cognitive attitudes and the locus of control to make a prediction for health promotion behaviors. [18].

The belief that individuals can have a special control over their health (internal control) automatically has a positive psychological and behavioral effect on them.The fact that locus of control plays an important role in health related behaviors and is seen as a mediator or part of the route between individual status, social status, and health forms[19] is thought to be similar to the present study. Also, this data support that a recognition of internal locus of control along with achievement or motivation related variables can substantially increase prediction concerning many of the variables which considered to be important.

Wolk&Ducette(1971) mentions achievement-motivation theory and locus of control theory, both theories make very similar predictions about the performance of certain subjects on these dependent variables[8].

Comprehensively, consideringthe results of this study as the moderating role of the internalbreast milk storage behavior locus control and relevance between knowledge and intention of implementation were verified, the education program including breast milk storage knowledge related contents should be developed to enhance exclusive breastfeeding. Also, in terms of the importance of internal breast milk storage behavior locus control,effective cognitive approach that can change wrong behavior and emotions so that the subject is aware of, responsible and interested in solving his or her own problemsis needed. For example, Motivational interviewingcould be suit to provision of knowledge of breast milk storage support bynurses, whose role increasingly includeslifestyle guidance.More comprehensive intervention may be required to achieve a changein future outcomes that is “implementation of breast milk storage”.

Other identified constraints on breast-feeding continuation include inadequate industry supportfor employed women, broad community disapproval ofbreastfeeding in public and minimal breastfeeding education during schooling. In addition to breast milk storage, these constraints should be considered in order to practice exclusive breastfeeding.

We should admit that the subjects of this study are limited to female college students. This means it is not possible to generalize these findings to other women of childbearing age inother regions or cultures. This can be the empirical reason deserving of further study.

## V.CONCLUSION

This study has provided evidence to supportthat locus of control was effective as a moderatorvariable in investigation the relationship between breast milk storage knowledge and intention to implement breast milk storage.

In addition, higher level of breast milk storage knowledge was found to be a positive factor for improving their intention to implement breast milk storage.

These variables accounted for 86.1% of the intention to implement breast milk storage.

Therefore, to improve the intention to implement breast milk storage, it is necessary to develop an intervention program to provide information and knowledge about storage. Also effective cognitive approach is needed that can change wrong behavior and emotions so that the subject is aware of, responsible and interested in solving his or her own problems. In addition, more research with a larger number of child baring women and various regions will be needed to generalize the results of this study.

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