# A Systematic Review of Factorial Structure of the Iowa Infant Feeding Attitude Scale (IIFAS)

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## Abstract

*Background*: The attitude towards lactation is one of the best predictors of breastfeeding. Iowa Infant Feeding Attitudes Scale (IIFAS) is used to measure the attitude toward lactation. IIFAS is a valid and reliable tool but factorial structure of this tool was reported various in different studies. The aim of this study is to assess factorial structure of IIFAS.

*Materials and Methods*: An extensive search was done in databases of databases of Medline, EMBASE, Web of Science, Scopus, Cochrane Library, and CINAHL until May 2018. Two independent researchers screened articles and in the next step, full texts of probably relevant articles were read and summarized. The quality of studies was performed by COSMIN checklist. The following keywords were used: (Iowa Infant Feeding Attitude Scale OR IIFAS) AND (Factor Analysis OR exploratory factor analysis OR confirmatory factor analysis OR Validity OR psychometric).

*Results*: Six studies were assessed in systematic review. In Spanish version, single- factor solutions with 9 items in sample of 1,294 pregnancy women was tested and showed a satisfactory fit to the data. In Japanese version, authors provided single-factor- model with 16 items. Factors loading were ranged from -0.06 to 0.68. Arabic version, EFA identified 6 factors with eigenvalues more than 1 explained 61% of total variance. However, scree plot suggested unidimensional structure. In Chinese version, EFA extracted four factors and labeled "Favorable to breastfeeding", "Favorable to formula-feeding", "Convenience" and "Sociological influences". In Canadian and Singapore version, the most sense model based on EFA was a three –factors model and labeled "Favorable to breast feeding", "Convenience" and "Favorable to formula feeding".

*Conclusion*: Four-factor model and three- factor model can be used in clinical practices and research. There is a need to further test single-factor model.

*Key Words*: Adolescents, Aggression, Children, Life Satisfaction, Self-rated Health.

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## 1- INTRODUCTION

Breast milk is an ideal and unique diet both in nutritional composition and in non-nutritive bioactive factors for infant growth and development (1-9). Also, breastfeeding associate with benefits for mothers (10-12). The positive effects of lactation have been well documented in improving physical, emotional and mental health and socioeconomic factors of mothers and infants (3, 4, 13). The breast milk is available, free of charge and free of bacterial contamination (3). Breastfeeding leads to reduced early life diseases, low birth weight, infant mortality, necrotizing enterocolitis, overweight, obesity and diabetes, respiratory infections, lymphoma, malignancy in newborns, and predisposes for achieving globally nutritional goals, such as prevention of the anemia of childbearing age and childhood overweight (4, 14, 15). Decline in breastfeeding in many countries is very worrisome (13); so that breastfeeding for the first 6 months has been reported to be only 38% (4, 16).

The decision making to start and continue lactation can be influenced by low knowledge, lack of family or social support, embarrassed by lactation, cultural factors and taboos, socioeconomic, psychological, and behavioral factors and attitude towards lactation (17-20). The attitude towards lactation is one of the best predictors of breastfeeding and is the basis for choosing ways to increase lactation rates (21). However, some of the factors affecting lactation such as emotional, psychological and mental factors and attitude cannot be directly measured (19). Measuring and evaluating attitudes toward lactation is a research question of many studies (22). The attitude toward lactation and breastfeeding are measured by the Iowa Infant Feeding Attitudes Scale (IIFAS) (22). The IIFAS was first designed by De La Mora and Russell (Mora and Russell; 1999) (23) to measure and assess the attitude of women towards lactation, and prediction the method and duration of breastfeeding. This 17-item scale based on five-point Likert scale is ranged from 1 (strongly- disagree) to 5 (strongly agree) (21, 23). IIFAS is a valid and reliable tool (20, 21, 24, 25), but their factorial structure were reported various in different studies, for examples studies performed in Japan, Spain and Lebanon reported a single- factor model (25-27), and two studies in Canada and Singapore reported a three-factor model (24, 28), and only one study in China reported a four – factor model (29). Three- factor model was best fitting model for Chinese, Canadian and Singapore version. Therefore, the present systematic review was conducted to assess factorial structure of IIFAS.

## 2- MATERIALS AND METHODS

### 2-1. Method

After choosing appropriate keywords and their combinations, an extensive search was done in databases of Medline, EMBASE, Web of Science, Scopus, Cochrane Library, and CINAHL until May 2018 without any language limitations. The following keywords were used: ("Iowa Infant Feeding Attitude Scale" OR "IIFAS") AND ("Factor Analysis" OR "Exploratory factor analysis" OR "Confirmatory factor analysis" OR "Validity" OR "Psychometric").

### 2-2. Data extraction and methodologic quality

Titles and abstracts of articles were searched by two independent authors and then each potentially relevant article was reviewed in detail to extract of relevant information; then this extracted information included into a predesigned form designed by reaches team. The methodological quality of studies was evaluated by COSMIN checklist (30) including internal consistency, reliability, and measurement error, content validity, and structure validity, hypothesis testing,

cross cultural, criterion, responsiveness, interpretability, and generalizability. Within this checklist, aspects of construct validity measured by seven questions (questions are shown in **Table.1**).

**Table-1**: The COSMIN checklist for methodological quality of studies (30).

| |
|---|
| 1- "Does the scale consist of effect indicators, i.e. is it based on a reflective model"? |
| **2**- "Was the percentage of missing items given"? |
| 3- "Was there a description of how missing items were handled?" |
| 4- "Was the sample size included in the analysis adequate?" |
| 5- "Were there any important flaws in the design or methods of the study?" |
| 6- "For CTT: Was exploratory or confirmatory factor analysis performed?" |
| 7-"For IRT: Were IRT tests for determining the unidimensionality of the items performed"? |

IRT; Item Response Theory; CTT: Classical Test Theory.

### 3- RESULT

The 17 items scale designed by De La Mora and Russell to measure and assess the attitude of women towards lactation, and prediction the method and duration of breastfeeding is shown in **Table.2**. The **Table.3** shown characteristic and quality of six studies included in the systematic review. The **Figure.1** shown the process of selection six studies included in the systematic review. Twenty studies founded through searching the databases and 10 articles excluded after reading title and abstract. Then, 10 full-text articles assessed in detail; 4 full-text articles excluded due to not assesse other psychometric properties. Finally, 6 trials included in systematic review.

In the **first** study, Tomás-Almarcha et al. (27). conducted a confirmatory factor analysis on Spanish version; a series of confirmatory factor analysis (CFA) were tested. The first model tested a single-factor structure of IIFAS with 17 items in a sample of 1,187 of Spanish women. The ratio of Chi-square ($X^{2)}$) to degrees of freedom ($X^2/df$), and comparative fit index (CFI) showed that model was not good fitted with data; the second model tested four- factor solution of the IIFAS explored in previous study (29) in a sample of 1,187 Spanish women. These factors included "Favorable to breastfeeding", "Favorable to formula-feeding", "Convenience", and "Sociological influences". Fit indexes $X^2/df$: 5.5, GFI: 0.720, CFI: 0.00 and Root mean square residual (RMSEA): 0.19, suggesting models did not fit well to the data. In third model, single- factor solutions with 9 items (2, 3, 6, 7, 9, 12, 13, 14, and 15) in samples of 1,294 pregnancy women were tested that consider as best model. Fit indexes were $X^2/df$: 5.5, GFI: 0.99, CFI: 0.97, RMSEA: 0.38; however, $X^2/df$: 5.5 were very slightly above an acceptable value of 5.

In the **second** study, Lau et al. in Singapore conducted a series of EFA using maximum likelihood (ML), and principal axis factoring (PAF) with varimax rotation in a sample of multiethnic Singapore pregnancy women. The Kaiser-Meyer-Olkin (KMO) test was 0.77 and Bartlett's test was significant. The most sense model theoretically and statistically was three - factor model. These factors with 15 items labeled as "Favorable to formula feeding", "Convenience" and "Favorable to breastfeeding". This model explained almost 35% of total variance. Loading factors ranged 0.35 to 0.90. Two items showed a low loading factor (0.3), and low

communalities. These included: item 5: "Formula-fed babies are more likely to be overfed than breastfed babies" and item 17: "A mother who occasionally drinks alcohol should not breastfeed her baby". EFA followed by a second-order of CFA, showing a satisfactory fit to the data. $X^2$/df: 227.39, GFI: 0.94, adjusted goodness of fit index (AGFI): 0.91, incremental fit index (IFI): 0.91; CFI: 0.91, and RMSEA: 0.06. Factor loading ranged from 0.46 to 0.95 at the first-order level and ranged from 0.45 to 0.78 at the second order level, respectively (28).

In the **third** study, in Canadian version, an exploratory factor analysis (EFA) were conducted using principal component analysis (PCA) on 1,283 pregnant women experienced their third trimester; 17 items were reduced to 13 items. Three factors extracted including "Favorable to breast feeding", "Convenience" and "Favorable to formula feeding" with a moderate cross loading for three items (24).

In the **fourth** study, Arabic version tested in a convenience sample of 196 women of Lebanon. EFA were performed using principal components factor (PCF) analysis and extracted 6 factors with eigenvalues more than 1 explained 61% of total variance. The first four factors eigenvalue were 3.47, 1.676, 1.573 and 1.007, respectively. According to scree plot, there was a sharp drop between the first and second factor that suggested unidimensional structure. Authors did not label for factors extracted their data (25).

In **the fifth** study, in Chinese version, Dai et al. conducted EFA using orthogonal varimax rotation. Four factors were extracted and explained 48.69% of total variance. KMO test was 0.77 and Bartlett's test for sphericity was significant; 8 items (3, 7, 9, 10, 12, 13, 15 and 16) loaded on the first factor "Favourable to breastfeeding". Six items (1, 2, 4, 5, 6 and 14) loaded on the second factors "Favourable to formula-feeding". Two items (2 and 15) loaded on the third factors and labeled "Convenience" and four items (7, 8, 11 and 17) loaded on the forth factor and named "Sociological influences" (26).

**I**n **last** study, Nanishi et al. in Japan conducted EFA using PCA without rotation. One-factor model was identified. Factors loading ranged from -0.06 to 0.68; items 5 and 17 had a low total-item correlation. Also, item 17 had a negative factor loading removed from questionnaire (29).

| | Items | Strong Disagreement | Disagreement | Neutral | Agreement | Strong Agreement |
|---|---|---|---|---|---|---|
| | **Table-2**: The 17 items designed by De La Mora and Russell (Mora and Russell; 1999) (23). | | | | | |
| 1 | "The benefits of breast milk last only as long as the baby is breastfed". | | | | | |
| 2 | Formula-feeding is more convenient than breastfeeding"." | | | | | |
| 3 | "Breastfeeding reinforces mother–infant bonding". | | | | | |
| 4 | "Breast milk is lacking in iron". | | | | | |
| 5 | Formula-fed babies are more likely to be overfed than breastfed babies"." | | | | | |
| 6 | "Formula-feeding is the better choice if the mother plans to go out to work". | | | | | |
| 7 | "Mothers who formula-feed miss one of the better experiences of | | | | | |

| | motherhood". | | | | | |
|---|---|---|---|---|---|---|
| 8 | "Women should not breastfeed in public places such as restaurants". | | | | | |
| 9 | Breastfed babies are healthier than formula-fed babies". | | | | | |
| 10 | "Breastfed babies are more likely to be overfed than formula-fed babies". | | | | | |
| 11 | Fathers feel left out if a mother breastfeeds"." | | | | | |
| 12 | "Breast milk is the ideal food for babies". | | | | | |
| 13 | Breast milk is more easily digested than formula"." | | | | | |
| 14 | "Formula is as healthy for infants as breast milk". | | | | | |
| 15 | Breastfeeding is more convenient than formula feeding"." | | | | | |
| 16 | "Breast milk is more economic than formula". | | | | | |
| 17 | "A mother who occasionally drinks alcohol should not breastfeed her baby". | | | | | |
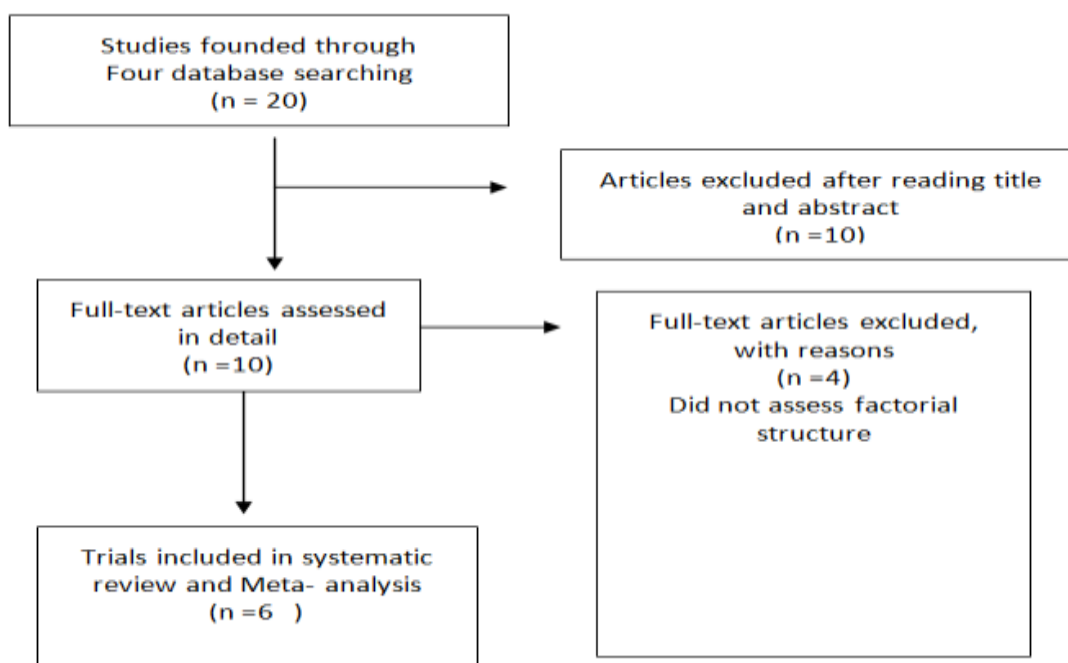


**Fig.1**: Flowchart of included studies.

## 4- DISCUSSION

Breastfeeding was associated with associate with benefits for mothers and infant. These included improving physical, emotional and mental health and socioeconomic factors of mothers and infants. Studies showed that attitude toward breastfeeding are one of affecting factors on breastfeeding (3, 4, 13). The attitude measured by the Iowa Infant Feeding Attitudes Scale (IIFAS) (23). The questionnaire is valid, reliable, easy to

understand and easy to complete. However, various factorial structures were reported. Therefore, the present systematic review was conducted to assess factorial structure of IIFAS. To the best of our knowledge, this is the first study which evaluated the factorial structural of IIFAS. The structure factorial of the Chinese version of the IIFAS scale appeared to consist of four-factors (26); three studies reported a single- factor model; for example one study in Spain (27), and anothers in Lebanon (25) and Japanese (29). Single- factors model explored by previous studies has been come under question by Tomás-Almarcha et al. (27), that believed two models were poorly adjusted.

In Japanese version, one-factor solution were extracted using PCA without any rotation and in Arabic version (29), extraction of factors was based on scree plot (25). Some studies especially studies performed in Muslim and Asian countries removed item 8 "Women should not breastfeed in public places such as restaurants ", and item 17 "A mother who occasionally drinks alcohol should not breastfeed her baby" due to religious and cultural. Future research work requires to further test these items in other Muslim countries and various cultural. Three-factors model was best fitting model for Canadian (24), and Singapore (28) version; these factors included "Favorable to formula feeding", "Convenience" and "Favorable to breastfeeding".

However, each study entered a different number of items than in the original version for example Japanese version with 17 items, Canadian version with 13 items and Singapore version with 15 items (28). Several possible explanations for difference in number of reported factors in different studies were suggested: difference in time of questionnaire administration (antenatal vs. postnatal period), difference in attitude toward breast feeding in various cultures, difference in decision-making strategic to determine number factors need be extracted for example difference in statistical strategies (orthogonal, CA and PCF), and scree plot and eigenvalues and the interpretability. Some studies suggested shorten version (13, 15 or 9 items) of the IIFAS. The shorter versions are easer and simpler to complete. However, it is noteworthy to mention that validity and reliability may be negatively affected by reduced the number of items of the tool (31).

## 4-1. Limitation

The generalizability of the findings of current systematic review was limited due to several reasons: all studies employed convenience sampling instead of random sampling that may increase sampling errors and biases, and almost all studies included in the current systematic review used cross sectional design and performed in a singles setting.

## 4-2. Clinical practice and further research

It could be employed for research work in which assesses women's knowledge about breastfeeding and effecting factors in taking decision to select breastfeeding method. It also can be used as a screening tool to assist health care provider in better understanding women's attitude toward infant feeding. IIFAS was significantly associated with mother's educational level, income, employment status, number of children and number of breastfeed children (20). Therefore, future research work should be tested measurement for above groups. Future research work using longitudinal data, random sampling, and multiple sitting is required. Three- factor solution with 9, 15 and 11 items and single factor solution need be tested in various populations in future research.

## 5- CONCLUSIONS

Four-factor model and three- factor model can be used in clinical practices and research to assess women's infant feeding attitudes. There is a need to further test single-factor model. As well as research work are required to generalize the finding to women in other countries intending.

## 6- CONFLICT OF INTEREST: None.

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| Authors, Area of study, Reference | Age, year | Sampling method and Sample size | Type of studies | Timing administration of test | Factorial structure | 1 | 2 | 3 | 4 | 5 | 6 | 7 | Main result |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| AlKusayer et al. Canada, References (24) | Between < 25 and ≥ 35 | 1,283 women in their third trimester | A cross-sectional design, nested within an observational cohort study | Third trimester | EFA | No | Yes | Yes | Yes | No | Yes | No | Three factors 13 items extracted including "favorable to breast feeding", "convenience" and "favorable to formula feeding". |
| Charafeddine et al., Lebanon, References (25) | 32.1±.7 | 130 pregnant women and 66 support mother convenience | A cross-sectional study | Pregnancy | EFA | No | No | No | Relatively Small Size | No | Yes | No | Six factors were extracted using PCA but scree plot showed a one single structure. |
| Dai et al., China, References (26) | 29.02±3.39 | 660 in-hospital postpartum women convenience | A prospective study | Postpartum | EFA | No | No | No | Yes | No | Yes | No | Four factors" favorable to formula-feeding" convenience", "sociological influences. |
| Lau et al., Singapore, References (28) | 29.61 | Convenient, 417 antenatal women | A cross-sectional | Pregnancy | CFA and EFA | No | Yes | Yes | Yes | No | Yes | No | Three factor solutions explained almost 35% of total variance. A second-order of CFA, showing a satisfactory fit to the data. |

**Table-1**: The characteristic of six studies included into systematic review

| Tomás-Almarcha et al. Spain, References (22) | 31.87±4.7 | A convenience sample, 1,354 pregnant women, | A cross-sectional | Third trimesters | CFA | No | Yes | Yes | Yes | No | Yes | No | Single factor solution with 17 items models and four-factor solution were not good fit to the data but single factor solution with 13 item was well with data. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Nanishi et al., Japan, References (29) | 16 years of age or older | - | Longitudinal study | Postpartum | EFA | No | Yes | Yes | Yes | No | Yes | No | Single factor model. |

EFA; exploratory factor analysis; CFA: confirmatory factor analysis.