Effect of Education Program on Mothers' Perception and Knowledge about Cystic Fibrosis

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Abstract

Background: Cystic fibrosis (CF) is a life-shortening, burdensome disease requiring complex knowledge to manage the disease. The management of chronic diseases, particularly in children, requires an integrated physical and psychological approach to both sick children and their family. Hence, this study aimed to assess the effect of education program on mothers' perception and knowledge about cystic fibrosis. Research design: a quasi-experimental (one-group pretest/posttest) research design was utilized to accomplish the study. The study was carried out in outpatient clinic at pediatric hospital affiliated with Ain Shams university. The study included a convenience sample of 60 mothers. Tools: Tools of data collection involved an Arabic-language self-administered questionnaire include; socio demographic characteristics, mothers’ knowledge and illness perception. Results: only 13.30% of the studied mothers had a high level of knowledge pre-intervention, compared with 85% of them post-intervention with highly statistically significant differences at $p <0.01$. Moreover, 18.3% of them had a positive perception pre-intervention, compared with 92% of them post-intervention with highly statistically significant differences at $p <0.01$. A highly statistically significant positive linear correlation between mothers’ knowledge and their perception at $p$. value $<0.01$ was reported. Conclusion: concluded that the educational program effectively improves mothers’ knowledge and perception regarding to cystic fibrosis. The total mothers’ knowledge and perception were significantly increased after the implementation of the educational program. Recommendation: Regular health education programs, particularly
targeting caregivers regarding cystic fibrosis, are essential for enhancing knowledge and maintaining safe practices. Conduct new research on effect of improving mothers’ knowledge on quality life of their children with cystic fibrosis.

**Keywords**

*Cystic fibrosis, Mothers, Perception, Knowledge*

**Introduction**

Cystic Fibrosis (CF) affects approximately 11,000 individuals in the United Kingdom (UK), with median predicted survival reported as 45 years of age. CF is an autosomal recessive disorder caused by mutation of the CF Transmembrane Conductance Regulator (*CFTR*) gene. The CFTR protein has an important role in coordinating transepithelial salt transport, which impacts on a number of important physiological functions (*Hangül et al.*, 2019). Most importantly, the salt transport defect impairs mucociliary airway clearance by disrupting the airway surface liquid and predisposing the airway to a build-up of excess and viscous mucus. Subsequent chronic airway infection and inflammation lead to airway damage and eventual respiratory failure as the primary cause of early death. In addition, the CF defect impacts on other epithelial surfaces, such as the sweat gland, pancreas and liver (*Perrem et al.*, 2019).

The incidence of CF varies according to the ethnic origin, ranging from one in 2,000 to one in 3,500 Caucasians born in Europe, the United States, and Canada, and with the lowest incidence among Hispanics (1:8,400 births), African-Americans (1:15,000 births), and the Asian population of Hawaii (1:89,000 births). Case reports from several Arabic countries including Saudi Arabia, Bahrain, Tunisia, Algeria, Lebanon and Egypt have suggested estimates ranging from 1 in 2,560 to 1 in 15,876 individuals (*El Falaki et al.*, 2021).

CF is also characterized by reduced exercise capacity and, although the exact mechanisms are not yet fully understood, physical inactivity, pulmonary, cardiac, and peripheral skeletal muscle function all contribute. Critically, higher aerobic fitness is associated with reduced mortality in patients with CF and therefore provides useful prognostic information. Furthermore, physical activity (PA) is related to aerobic fitness, independent of sex, lung function, body size and muscle power, with higher PA
associated with a slower decline in lung function and fewer hospitalizations (Denford et al., 2020). There is good evidence that PA has a positive impact on bone mineral density, glycemic control and mucociliary clearance, all of which contribute to wellbeing for a person with CF (Scotet et al., 2020).

Parents of children with CF face a number of increased responsibilities in caring for their children’s well-being compared to parents of children without a chronic illness. The practical support given by parents can often continue into children’s teen and young adult years with CF patients often transitioning away from the family home at a later age than peers without chronic illness. Further individuals with CF can often find the transition from paediatric to adult care challenging and continue to seek support from their parents (Reisinho et al., 2020).

Recent research suggests that up to 50% of parents of children with CF may experience clinically significant symptoms of anxiety and up to 35% may experience clinically significant symptoms of depression. Dual presentations are also common (Quittner et al., 2014)

Open, negotiable and flexible roles between nurses and caregivers in paediatric environments are critical to the development of good therapeutic relationships and the optimisation of child health outcomes. Further, the care that caregivers provide to their child is the single most important determinant of child health outcomes. Nursing today is characterised by an emphasis on family-centred care in which care is delivered in the context of open relationships with the family. The promotion and integration of psychological services for caregivers appears to be critical to psychosocial well-being and is likely to improve caregivers’ capacity by better supporting them (Byra et al., 2021).

Significant of study:

Cystic fibrosis (CF) is a highly complex disease. The treatment regimen requires 2 to 3 h daily and is highly burdensome. Knowledge of disease management (KDM) is critical to optimize treatment adherence and health outcomes. Significant gaps in KDM
have been identified in youth with CF and their parents and associated with negative health effects (Kazmerski et al., 2021).

Gaps in knowledge and perception are associated with poor treatment skills and adherence. Rates of adherence in adolescents are less than 50%. Thus, parents play a critical role in managing and “modeling” their adolescents ‘treatment-related behaviors (e.g., set-up and cleaning; reminders) and need accurate knowledge about them and their effects. In contrast, factual medical knowledge is not integral to performing treatments (Denford et al., 2020).

Illness perceptions have been found to be a strong predictor of the psychological adjustment of individuals with acute and chronic illness. There is no current, validated measure of parent knowledge and few studies have examined CF-specific knowledge in parents of adolescents with CF (Fitzgerald et al., 2018). Thus, this study evaluated the effect of education program on mothers' perception and knowledge about cystic fibrosis
Methods

Aim of the study: Assess the effect of education program on mothers' perception and knowledge about cystic fibrosis, through:
- Assess the mothers' perception and knowledge about cystic fibrosis
- Develop and perform educational program for mothers about cystic fibrosis
- Evaluate the effect of education program on mothers' perception and knowledge about cystic fibrosis.

Research hypothesis

H1: Mothers’ knowledge related to cystic fibrosis will be improved after educational program application.

H2: Mothers’ perception related to cystic fibrosis will be improved after educational program application.

Research design

Quasi-experimental (one-group pre/post-test) research design was utilized to accomplish the aim of this study.

Setting

The study was carried out in outpatient clinic at pediatric hospital affiliated with Ain Shams university.

Participant

A convenient sample of (N=60) mothers from the previously mentioned settings, who agreed to participate was recruited in the study. The study was extended over four months, from 1st March to the end of June 2021.

Tools of Data Collection
Tools of data collection involved an Arabic-language self-administered questionnaire consisting of three parts:

**Part I: Socio demographic characteristics:** this part concerned with the socio-demographics profile of the studied mothers included age, education level, marital status, income, training program and employment status.

**Part II: Mothers’ Knowledge related to cystic fibrosis:** adapted from (Van Schandevyl et al., 2021) the knowledge part had 12 questions: concept of cystic fibrosis “2 questions”, Clinical manifestation and complication of Cystic fibrosis “3 questions”, Causes and risk factors Cystic fibrosis “2 questions”, Nutrition and physical activity for child with Cystic fibrosis “2 questions”, Management and treatment of Cystic fibrosis “3 questions”.

**Scoring guide**

For knowledge score the points were distributed as (Yes = 2, No = 1 and I don’t know = 0). The total knowledge score ranged from 0 to 24, the total knowledge score was categorized as the following less than 60% “unsatisfaction” and more than 60% “satisfactory”.

**Part III: Illness perceptions:** Mothers’ perception related CF were measured using the Illness Perceptions Questionnaire-Revised (IPQ-R; Moss-Morris et al., 2002). This measure examines individuals’ perceptions of illness through six subscale included a 18-items; three-item scale examining personal control of illness (e.g. “People with CF have the power to influence their illness”) and three items subscale examining women’s perceptions of the effectiveness of medical treatment (treatment control) for CF (e.g. “My child’s treatment can control their CF”). Next, the consequences of illness subscale examined mothers’ anticipated out- comes and effects stemming from the illness (e.g. “CF causes difficulties for those who are close to my child with CF”) with three items.

Perceptions of the nature of CF over time were assessed with the three items on the timeline-cyclical subscale (e.g. “CF is very unpredictable”). Mothers’ overall understanding of CF and its impli- cations was measured with the three-item illness coherence subscale (e.g. “CF is a mystery to me”). Finally, mothers’ emotional representations of illness were examined on a three-item subscale (e.g. “When I think
about my child’s CF I become upset”). This item was measured with yes (1 score)/no (0 score) dichotomous response options. A total score was calculated by summing together the number of “yes” responses on each symptom subscale. Total scores for each of these subscales were calculated by summing each item in the subscale. The total score ranged from 0 to 18. A positive perception if score 12 to 18 and negative perception if less than 12.

Reliability

The adapted tools were tested for their reliability by using Cronbach’s alpha coefficient test in SPSS program version 24 by a statistician. It was carried out on 6 of mothers and the results were as the following: Internal consistency reliability (Cronbach's α) for knowledge emerged as good 0.823, and internal consistency reliability (Cronbach's α) for perception emerged as excellent 0.901.

Pilot study

The validated questionnaire was subsequently pre-tested on 6 mothers (10%), who later were included from the main study. It is carried out prior to data collection to assess the feasibility, duration, cost, and adverse events of a full-scale research project and to enhance the study design.

Data collection

The researchers were accessible for data collection two days a week for each hospital, from 10 a.m. to 2 p.m., at outpatient clinic affiliated to the pediatric hospital at Ain Shams university. The pretest, educational program session implementation, and posttest data were collected during a four-month period from March 1st to the end of June 2021. The data was gathered through a self-structured interviews sheet, mothers complete it by themselves. Each questionnaire took 10 minutes to complete.

Study framework
The framework of the study was carried out through the following four phases: a) **Assessment phase:** assessment of mothers’ knowledge, and perceptions regarding cystic fibrosis. b) **Planning phase:** based on the findings of the assessment phase; goals, priorities, and expected outcomes will be formulated to meet mothers' needs of knowledge and perception related to cystic fibrosis. C) **Implementation phase:** Booklets, boosters, and brochures for teaching the studied mothers were prepared by researchers in the simple Arabic language. Implementation of the educational program was carried out at the previously mentioned settings. The educational program consisted of 3 consecutive sessions. The session was in small groups (N=10 mothers) with a duration of approximately 20 -30 minutes. **Evaluation phase:** to explore the effect of the educational program on improving knowledge, and perception of mothers related to cystic fibrosis, a post-test (immediately after the application of the program), was done using the same tool.

**Ethical Considerations**

The study was approved by the research ethical Committee of Faculty of Nursing, Menofiya University. All participants agreed to participate in the study. The questionnaire was filled in anonymously and the data were kept confidential and used for research purposes only. Oral permission was also optioned from each nurse once the researcher told them of the study's aim, and purpose. In addition, participants informed that they can also withdraw from the study at any time they choose.

**Administrative design:**

Necessary official approval to conduct the study was obtained from the director of the pediatric Hospital affiliated to Ain Shams university. Oral permissions to conduct the study were obtained from the head of the outpatient clinic affiliated to the previously mentioned research settings after explaining the purpose of the study.

**Statistical Analysis**

The collected data was coded and entered to the statistical package of social sciences (SPSS) (SPSS Inc; version 24; IBM Corp., Armonk, NY, USA). After complete entry, data was explored for detecting any error, then, it was analyzed by the same program for
presenting frequency tables with percentages. Qualitative data was presented as number and percent. Besides, Quantitative data were described as mean / SD as appropriate. The study data was tested for normality by Kolmogorov-Smirnov test. square is a statistical test used to examine the differences between categorical variables. Spearman correlation (r) was performed to measure the strength of a linear relationship between ordinal variables. The results were considered statistically significant at P ≤ 0.05.

Results

Table (1) Distribution of studied mothers according to their characteristics (n=60)

<table>
<thead>
<tr>
<th>Items</th>
<th>n</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Age</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>20 - &lt;30</td>
<td>13</td>
<td>21.7</td>
</tr>
<tr>
<td>30 - &lt;40</td>
<td>36</td>
<td>60</td>
</tr>
<tr>
<td>40 – 50</td>
<td>11</td>
<td>18.3</td>
</tr>
<tr>
<td><strong>Mean (SD)</strong></td>
<td>34.90±3.70</td>
<td></td>
</tr>
<tr>
<td><strong>Educational level:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Read and write</td>
<td>13</td>
<td>21.7</td>
</tr>
<tr>
<td>Preparatory school</td>
<td>27</td>
<td>45</td>
</tr>
<tr>
<td>Secondary school</td>
<td>12</td>
<td>20</td>
</tr>
<tr>
<td>University</td>
<td>8</td>
<td>13.3</td>
</tr>
<tr>
<td><strong>Marital status:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Married</td>
<td>54</td>
<td>90</td>
</tr>
<tr>
<td>Divorced</td>
<td>4</td>
<td>6.7</td>
</tr>
<tr>
<td>Widow</td>
<td>2</td>
<td>3.3</td>
</tr>
<tr>
<td><strong>Employment status:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Employee</td>
<td>19</td>
<td>31.7</td>
</tr>
<tr>
<td>Housewife</td>
<td>41</td>
<td>68.3</td>
</tr>
<tr>
<td><strong>Training courses about Cystic fibrosis:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>3</td>
<td>5</td>
</tr>
<tr>
<td>No</td>
<td>57</td>
<td>95</td>
</tr>
<tr>
<td><strong>Family income</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sufficient</td>
<td>15</td>
<td>25</td>
</tr>
<tr>
<td>Insufficient</td>
<td>45</td>
<td>75</td>
</tr>
</tbody>
</table>

The study included 60 mothers; their mean age was 34.90 ± 3.70 years. Also, 60% (54 out of 60) were married. Regarding their level of education, 45% of them (27 out of 60) had secondary education, 68.3% (41 out of 60) were housewife. About attending
training programs, 95% (57 out of 60) did not attend training programs about cystic fibrosis (Table 1).

Table (2) Distribution of studied mothers related their knowledge about cystic fibrosis at pre and post intervention (n=60)

<table>
<thead>
<tr>
<th></th>
<th>Pre intervention</th>
<th></th>
<th>Post intervention</th>
<th></th>
<th>Chi-square</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Correct</td>
<td>incorrect</td>
<td>Correct</td>
<td>incorrect</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>n</td>
<td>%</td>
<td>n</td>
<td>%</td>
<td>n</td>
<td>%</td>
</tr>
<tr>
<td>Concept of Cystic fibrosis</td>
<td>9</td>
<td>15</td>
<td>51</td>
<td>85</td>
<td>53</td>
<td>88.3</td>
</tr>
<tr>
<td>Clinical manifestation and</td>
<td>11</td>
<td>18.3</td>
<td>49</td>
<td>81.7</td>
<td>55</td>
<td>91.7</td>
</tr>
<tr>
<td>complication of Cystic fibrosis</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Causes and risk factors</td>
<td>8</td>
<td>13.3</td>
<td>52</td>
<td>86.7</td>
<td>51</td>
<td>85</td>
</tr>
<tr>
<td>Cystic fibrosis</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nutrition and physical activity for</td>
<td>10</td>
<td>16.7</td>
<td>50</td>
<td>83.3</td>
<td>54</td>
<td>90</td>
</tr>
<tr>
<td>child with Cystic fibrosis</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Management and treatment of Cystic</td>
<td>7</td>
<td>11.7</td>
<td>53</td>
<td>88.3</td>
<td>52</td>
<td>86.7</td>
</tr>
<tr>
<td>fibrosis</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**table 2** revealed that 15%, 18.3%, 13.3%, 16.7%, 11.7% of them had correct knowledge concerning concept of cystic fibrosis, clinical manifestation and complication of cystic fibrosis, causes and risk factors cystic fibrosis, nutrition and physical activity for child with cystic fibrosis and management and treatment of cystic fibrosis, respectively pre-intervention. Markedly the previously mentioned results changed to be 88.3%, 91.7%, 85%, 90%, 86.7% respectively post-intervention with highly statistically significant differences at p <0.01 for all.
Table (3) Distribution of studied mothers related their perception about cystic fibrosis at pre and post intervention (n=60)

<table>
<thead>
<tr>
<th></th>
<th>Pre intervention</th>
<th></th>
<th>Post intervention</th>
<th></th>
<th>Chi-square</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Positive</td>
<td>n</td>
<td>%</td>
<td>negative</td>
<td>n</td>
<td>%</td>
</tr>
<tr>
<td>Perceptions of the nature of CF</td>
<td>12</td>
<td>20</td>
<td>48</td>
<td>80</td>
<td>54</td>
<td>90</td>
</tr>
<tr>
<td>Mothers’ overall understanding of CF</td>
<td>11</td>
<td>18.3</td>
<td>49</td>
<td>81.7</td>
<td>53</td>
<td>88.3</td>
</tr>
<tr>
<td>mothers anticipated outcomes and effects stemming from the illness</td>
<td>10</td>
<td>16.7</td>
<td>50</td>
<td>83.3</td>
<td>51</td>
<td>85</td>
</tr>
<tr>
<td>women’ perceptions of the effectiveness of medical treatment</td>
<td>13</td>
<td>21.7</td>
<td>47</td>
<td>78.3</td>
<td>55</td>
<td>91.7</td>
</tr>
<tr>
<td>personal control of illness</td>
<td>9</td>
<td>15</td>
<td>51</td>
<td>85</td>
<td>54</td>
<td>90</td>
</tr>
<tr>
<td>mothers’ emotional representations of illness</td>
<td>11</td>
<td>18.3</td>
<td>49</td>
<td>81.7</td>
<td>56</td>
<td>93.3</td>
</tr>
</tbody>
</table>

Table 3 revealed that 20%, 18.3%, 16.7%, 21.7%, 15% of them had positive perception concerning Perceptions of the nature of CF, Mothers’ overall understanding of CF, mothers anticipated outcomes and effects stemming from the illness, women’ perceptions of the effectiveness of medical treatment, personal control of illness, respectively pre-intervention. Markedly the previously mentioned results changed to be 90%, 88.3%, 85%, 91.7%, 90% respectively post-intervention with highly statistically significant differences at p <0.01 for all.
Figure (1) Distribution of studied mothers related total knowledge at pre and post intervention (n=60)

Figure 1 showed that 13.30% of the studied mothers had a high level of knowledge pre-intervention, compared with 85% of them post-intervention with highly statistically significant differences at $p < 0.01^{**}$.

Figure (2) Distribution of studied patients related total practice at pre and post intervention (n=60)

Figure 2 demonstrated that 18.30% of the studied mothers had a positive level of perception pre-intervention, compared with 92% of them post-intervention with highly statistically significant differences at $p < 0.01^{**}$. 
Table (4) Correlation between studied variables

<table>
<thead>
<tr>
<th></th>
<th>Total knowledge pre intervention</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Total perception pre intervention</td>
<td>r. 0.645</td>
<td>p. &lt;0.01**</td>
</tr>
<tr>
<td>Total knowledge post intervention</td>
<td>r. 0.701</td>
<td>p. &lt;0.01**</td>
</tr>
</tbody>
</table>

Table 4 reported that there was a highly statistically significant positive linear correlation between women’s knowledge and their perception pre and post intervention at r. 0.645 and r. 0.701 at p. value <0.01.

Table (5): Multiple Linear regression model for mothers’ perception (n=130).

<table>
<thead>
<tr>
<th></th>
<th>Unstandardized Coefficients</th>
<th>Standardized Coefficients</th>
<th>T</th>
<th>P. value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>B</td>
<td>B</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Education level (High)</td>
<td>.501</td>
<td>.386</td>
<td>6.196</td>
<td>.000**</td>
</tr>
<tr>
<td>Age</td>
<td>.199</td>
<td>.241</td>
<td>2.101</td>
<td>.031*</td>
</tr>
<tr>
<td>Employment status (Employee)</td>
<td>.201</td>
<td>.273</td>
<td>1.870</td>
<td>.040*</td>
</tr>
<tr>
<td>Training courses (Yes)</td>
<td>.399</td>
<td>.246</td>
<td>5.107</td>
<td>.001**</td>
</tr>
</tbody>
</table>

Model | R² | Df. | F   | P. value |
Regression | 0.049 | 4   | 11.955 | .000**  |

a. Dependent Variable: Total perception
b. Predictors: (constant): Education level, age, employment and training courses

Table (5) stated that high significant model detected through F test value was 11.955 with p value. 000. This model explain 49% of the variation in mother perception detected through R² value 0.49. Also, explained that, high educational level and training courses had high
frequency positive effect on mother perception at p value <0.01**. While, age and employee had slight frequency positive effect on mother perception at p value <0.05*.

Discussion

The creative challenge of health education for chronic illness is the translation of theory-based intervention method into practical strategy that can be organized into a logical series of learning activities to influence change at environment, cognitive and behavioral factor. A case example describes the development and implementation of a comprehensive health education intervention for mothers who provide the care for children suffered from CF (Douglas et al., 2021 & Schneider et al., 2021).

The care for children with a CF is complex. Mothers of these children may experience high levels of stress in managing their child's disease, potentially leading to negative effects on their child's health outcomes (Stanojevic et al., 2021), so the current study aimed to assess the effect of education program on mothers' perception and knowledge about cystic fibrosis

Regarding the studied mother’s socio demographic profile, the present study showed that their mean age was 34.90 ± 3.70 years. Also, the most of them were married. Regarding their level of education, less than half of studied mothers had secondary education, about two thirds were housewife. About attending training programs, the most of studied mothers did not attend training programs about cystic fibrosis. These results may be due to lack of interest in training mothers and the lack of time available for these training programs. These results were in cohort by Pinar Senkalfa et al. (2020) who found that more than half of studied mothers had university education. While, supported with the study conducted by Unal Yuksekgonul et al. (2020) who revealed that the majority of studied mothers were housewife and more than one third of them had high school.

The current study revealed that, the mothers’ knowledge about cystic fibrosis markedly improved post-intervention than pre-intervention with highly statistically significant differences at p <0.01 for all domains of knowledge and total score of them. The researcher attributed these results to effective education program done by the
researchers through using different teaching methods and illustrative methods. These results consistent with the study done by Yilmaz Yegit et al. (2021) who reported that Education was highly effective to increase the rate of proper practices and knowledge for nebulizer hygiene among mothers with CF children at p value <0.01. Also, supported with the study by Goldbeck, 2015 who detected that knowledge level and Quality of life significantly improved post education program at (p = .01). Temme et al. (2015) assessed the effectiveness of genetic counselling by assigning 100 parents of children with CF to either a genetic counselling or genetic counselling and video intervention program. Post counselling knowledge scores significantly improved in both groups after the intervention.

While, disagreement with the study by Nicolais et al. (2018) who revealed that parents correctly answered approximately 85% of items on the KDM-CF-P pre intervention.

Moreover, regarding their perception related to CF, the current study showed that less than one fifth of the studied mothers had a positive level of perception pre-intervention, compared with the most of them post-intervention with highly statistically significant differences at p <0.01**. These results may be due to preparing the training program by researchers based on the pre assessment and avoid using medical terms to avoid misunderstand. These results disagreement with the study by Beinke et al. (2016) who reported that mothers had high perception related nature of disease and caring of their children without any intervention. While, cohort with the study conducted by Cardoso Vaz et al. (2018) who showed that intervention program had positive effect on parents’ perception related care children with chronic disease. In addition, Janssens et al. (2016) suggested that support education program for improving parents’ attitude and perception about CF.

In addition, the present results showed that there was a highly statistically significant positive linear correlation between women’ knowledge and their perception pre and post intervention at r. 0.645 and r. 0.701 at p. value <0.01. Also, explained that, high educational level and training courses had high frequency positive effect on mother perception at p value <0.01**. While , age and employee had slight frequency positive effect on mothers perception at p value <0.05*. These results consistent with the study conducted by Tluczek et al. (2019) who reported that education level and level of knowledge of parents had high effect on improving their perception with p value <0.01**.
Also, regular with Moola et al. (2017) who stated that counseling program had significant effect on mothers’ perception with p value <0.05*. And Chudleigh et al. (2016) also reported that age and education level had high predictor effect for parent perception related CF screening.

**Conclusion**

Based on our current study, it was concluded that the educational program effectively improves mothers’ knowledge and perception regarding to cystic fibrosis. The total mothers’ knowledge and perception were significantly increased after the implementation of the educational program.

**Recommendation**

Based on the finding of the present study the following recommendations are suggested:

1. Regular health education programs, particularly targeting caregivers regarding cystic fibrosis, are essential for enhancing knowledge and maintaining safe practices.

2. Continues updating and refreshing the mothers’ knowledge through workshops.

3. Development of E-learning program about cystic fibrosis for nurses for improving their awareness role

4. Replication of the present study on a larger representative probability sample size in various Egypt governorates is recommended to achieve generalization of the results.

5. Conduct new research on effect of improving mothers’ knowledge on quality life of their children with cystic fibrosis.

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