

Effect of Educational Program about Medication Considerations on Promoting Quality of Pharmacotherapy among Elderly with Multi-Morbidity

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Abstract

Background: The drug related problems are common among elderly especially those with multi-morbidity who are involved in complex drug regimen. So, there is greater focus on medication considerations that help them in proper medication use. **Study design:** A quasi-experimental study design was selected in this study. **Study settings:** This study was carried out at the Health Insurance Hospital outpatient clinics at Tanta city, Dar El Saada Geriatric Home in Tanta city and outpatient clinics of Tanta University (Medical, Orthopedic, Urology and Ophthalmology). **Study subjects:** A convenience sample of 75 elderly patients who attended the previously mentioned settings was included in the study. **Study tools:** Three tools were utilized in this study: **Tool I:** A structured interview schedule: **Part 1:** Socio-demographic characteristics of the studied elderly. **Part 2:** Medical history of the studied elderly. **Tool II:** BASNEF Model Based Questionnaire: **Part 1:** Beliefs about Medicines Questionnaire (BMQ). **Part 2:** Drug Attitude Inventory (DAI). **Part 3:** Assessment of Subjective Norms. **Part 4:** Assessment of Enabling Factors. **Tool III:** Medication Management Instrument for Deficiencies in Elderly (MEDMAIDE). **Results:** There was statistically significant improvement on elderly beliefs about medication, their attitude toward medication, overall influential motivator for appropriate medication use, the enabling factors and medication management deficiency in all phases of evaluation pre, immediately and three months follow up after program implementation. **Conclusion and recommendations:** The BASNEF model based educational program was effective in improving the elderly patients' beliefs and attitude toward medication, overall influential motivator and the enabling factors which support them. Therefore, the community health nurse should assess the multi-morbid elderly and organize health education programs based on BASNEF model about safe medication use among them.

Key words: Medication considerations, Pharmacotherapy, Elderly, Multi-morbidity.

Introduction:

Worldwide, there has been a massive increase in the number of older persons over the last few decades. In Egypt, there is gradual increase in the numbers of older people. According to Central Agency for Public Mobilization and Statistics (CAPMAS) the number of older persons who are sixty years and over, reached 6.7% from the total population in 2019. So, the elderly population represents a big nation which requires more attention from health care system **(CAPMAS, 2019)**. Unfortunately, the majority of elderly patients usually suffer from coexistence of two or more chronic conditions which is known as multi-morbidity. Multi-morbidity usually associated with polypharmacy and poor health outcomes **(Williams et al., 2016)**. Multi-morbidity which usually associated with complex drug regimen, it includes not only the prescribed medications but also the over the counter (OTC) medications such as herbal supplements. The risk of drug related problems increases among patients with polypharmacy. Additionally, polypharmacy reduces adherence to recommended medication regimen and may contribute to physical impairment and lower cognitive functions **(Dagli et al., 2014 & Sheref et al., 2019)**.

BASNEF model (Belief, Attitude, Subjective Norms, and Enabling Factors) is one of the comprehensive educational models for studying behaviors. It offers plans for behavior change and indicator on the factors effective for the individuals' decision making. This model was developed by John

Hubly in (1988). It can significantly have impact on modifying awareness and attitude as well as enhancing individuals' performance **(Bandehehlahi et al., 2019)**.

Community health nurse's role is very important in management of elderly patients' chronic diseases and their associated polypharmacy, and preventing harmful consequences of them because the majority of chronic conditions are treated with medications. The nurse also, has to assess the elderly needs and develop scientific health education programs based on appropriate educational model to provide an effective care and optimizing pharmacotherapy among elderly **(Jimmy & Jose 2011 & Algameel et al., 2020)**.

The study significance: The drug related problems are common among elderly especially those with multi-morbidity who are involved in complex drug regimen. This may lead to ineffective drug use and occurrence of adverse drug effects which may be dangerous especially among the elderly population. Therefore, the aim of the study was to evaluate the effect of educational program about medication consideration on promoting quality of pharmacotherapy among elderly with multi-morbidity.

Aim of the Study:

The aim of the study was to evaluate the effect of educational program about medication considerations on promoting quality of pharmacotherapy among elderly with multi-morbidity.

Research Hypothesis: The quality of pharmacotherapy of elderly who follows the educational program about medication considerations is expected to be improved.

Subjects and method

Subjects

Study design: A quasi-experimental study design was utilized in the current study.

Study Settings: This study was carried out at the Health Insurance Hospital outpatient clinics at Tanta city, Dar El Saada Geriatric Home in Tanta city and outpatient clinics of Tanta University (Medical, Orthopedic, Urology and Ophthalmology).

Subjects: A convenience sample of 75 elderly patients who attended the previously mentioned settings was included in the current study.

Tools of data collection:

Three tools were utilized as the following:

Tool I: A structured interview schedule: It was developed by the researcher according to the related literature review. It consisted of the following parts:

Part (1): Socio-demographic characteristics of the studied elderly: It was included data about age, sex, marital status, educational level, previous occupation, family income, and place of residence.

Part (2): Medical history of the studied elderly: It included data about previous hospitalizations, its causes, types of chronic diseases and its duration, and number of medications taken on daily basis.

Tool II: BASNEF Model Based Questionnaire: included the following parts:

Part (1): Beliefs about Medicines Questionnaire (BMQ): it was developed by Horne et al, in (1999). The Master student of this study adopted it. It consisted of 18-items which assessed belief toward medication. It had two parts: the BMQ-Specific which assessed beliefs about medicine used for a particular condition and the BMQ-General which assessed beliefs about medicines in general. BMQ-Specific composed of two subscales Specific-Necessity and Specific-Concern. The Specific-Necessity was a five-item treatment necessity subscale and Specific-Concern was a five-item treatment concern subscale. BMQ-General included two subscales General-Overuse (four items) and General-Harm (four items) (Horne et al., 1999).

Scoring system: All BMQ items were scored by 5 points Likert scale (1 for strongly disagree, 2 for disagree, 3 for uncertain, 4 for agree and 5 for strongly agree).

Overall score of the BMQ scales was calculated as follows:

- **Total score of BMQ-Specific (Specific-Necessity (BMQ-SN) subscale and the Specific-Concern (BMQ-SC) subscale)**
- Negative belief toward medication used: < 50% of total score.
- Positive belief toward medication used: ≥ 50% of total score.
- **Total score of BMQ-General (General-Overuse (BMQ-GO) subscale and General-Harm (BMQ-GH) subscale).**

- Positive view toward medication in general: < 50% of total score.
- Negative view toward medication in general: \geq 50% of total score

Part (2): Drug Attitude Inventory (DAI):

It was developed by Hogan et al., (1983) to assess features of the patient's perceptions and experiences of treatment. It included a set of questions each with true or false answers according to the participant's perceptions and experiences toward treatment. The Master student of this study adopted it. The total score calculated from a set of answers, each positive answer was given (+1) and each negative answer was given (-1) (Hogan et al., 1983).

The overall score was classified as the follows:

The total score for each patient was calculated by summation of the positive scores, minus the negative scores.

- A positive total score meant positive attitude toward medication.
- A negative total score meant negative attitude toward medication.

Part (3): Assessment of Subjective Norms:

The researcher developed this part in the light of related literature review. It consisted of questions about influential motivator of elderly to improve their adherence behaviors toward their prescribed medication such as spouse, doctor, pharmacist, care giver, friends and mass media (Bandehelahi et al., 2019).

The overall score was classified as follows:

- < 60% of total score = inadequate motivation.
- \geq 60% of total score = adequate motivation.

Part (4): Assessment of Enabling Factors:

The researcher developed this part in the light of related literature review. It consisted of questions about the enabling factors that made it possible for elderly to improve their behaviors toward appropriate medication use such as the following: resources, living condition, societal support and skills that facilitate behavior occurrence (Bandehelahi et al., 2019).

The overall score:

- Inadequate enabling factors (support): < 60% of total score.
- Adequate enabling factors (support): \geq 60% of total score.

Tool III: Medication Management Instrument for Deficiencies in Elderly (MEDMAIDE):

It was developed by Orwig et al., (2006). It was developed to assess an older adult's ability to manage medication in the home setting covering three domains which included what a person knew about medication taken, whether the person knew how to take their medications and if the person knew how to get the medications from the doctor or the pharmacy. The researcher adapted it in the current study. The elderly responded to each item by either yes or no. Responses with no took score (1) while responses with yes took score (0) (Orwig et al., 2006).

The overall score:

- Mild deficiency: <50% of total score.
- Moderate deficiency: 50%- 70% of total score.
- High deficiency: >70% of total score.

Method

The study was conducted as follows:

1) Administrative approval:

- An official letter was obtained from the Dean of the Faculty of Nursing to conduct the study and directed to the managers of outpatient clinics of Health Insurance, Dar El Saada Geriatric Home and Outpatient Clinics of Tanta University Hospital.
- The managers of the previously mentioned settings were notified about the goal and objectives of the study to obtain their permission to gather the data.

2) Ethical and legal considerations: -

- The approval of the Scientific Research Ethics Committee of Faculty of Nursing, Tanta University was obtained on the proposal of the study (Code: 72/6/2022).
- All study participants gave their informed consent after providing complete clarification and explanation about the study purpose.
- All subjects were informed that they have the freedom to withdraw from the study whenever they want.
- There is no harm caused to the subjects by the study.
- The data confidentiality and the elderly participant's privacy were considered.

3) Developing the tool:

- Tool I and tool II part (3 and 4) had been developed by the researcher based on related literature review.
- Tool II (part 1) was adopted and has been translated into Arabic language by the researcher.
- Tool II part 2 and tool III of the study were adapted, modified and translated into Arabic language by the researcher.

4) Validity and reliability of the study tools:

- The study tools were tested for face and content validity by jury of five professors' expertise in the field of Community Health Nursing, Faculty of Nursing, Tanta University before the study carrying out.
- The study tools were tested for its reliability through using Chronabach's alpha test, it had been computed and was found to be (0.872) for the entire study tools while the reliability of tool II BASNEF model-based questionnaire was (0.701) and tool III (Medication Management Instrument for Deficiencies in Elderly (MEDMAIDE) was (0.882).

5) The pilot study:

- It was conducted on 10% of elderly patients for testing clarity, applicability of the study tools and to identify any obstacles that may be confront the researcher during data collection. The data obtained from it were included in the study sample because there weren't any significant modifications in the study tools.

6) The actual study:

- The researcher met the elderly participants of Tanta university hospital's outpatient clinics in the waiting area and the follow up had been conducted in the same settings. Moreover, the researcher met the elderly patients of health insurance hospital in the waiting area and the follow up had been conducted in the same settings or

by telephone conversation. In the same time, the elderly participants of Dar El Saada geriatric home were met in the living room of their floors and the follow up had been conducted in the same settings.

- The structured interview sheet was fulfilled from each elderly at the previously mentioned settings.
- The time for data collection from each elderly was 20-30 minutes.
- The researcher met the elderly participants 2 days per week.
- The educational program was presented to the elderly patients in seven sessions. Each session ranged from 20 to 30 minutes and the total time of all sessions was (200) minute.
- The field work of this study started from November (2022) to June (2023) to be distributed as follow: assessment and planning phase (started from November to the end of January 2023), implementation phase (started from the first of February to the end of April 2023) and the evaluation phase (started from the first of May to the end of June 2023).

7) Statistical analysis of the data:

The collected data were coded, entered, tabulated and analyzed using SPSS (Statistical Package for Social Science) version 22. The range, mean and standard deviation were computed for quantitative data. For qualitative data, which describe a categorical set of data by frequency, percentage or proportion of each category, comparison between two

groups and more was done using Chi-square test (χ^2). For comparison between means of two groups of non-parametric data of independent samples, Z value of Mann-Whitney test was used. For comparison between means of three related groups (pre, immediate and three months follow-up post implementation of the educational program), χ^2 value of Friedman test was calculated for non-parametric data. For evaluating correlation between variables Pearson's correlation coefficient(r) had been utilized.

Results:

Table (I) represents the elderly participant's distribution according to their socio-demographic characteristics. The table shows that, the studied elderly age ranged from 60-80 years old with a mean age (66.88±6.40) year. Concerning their sex and marital status, over half (53.3%) of them were females and 70.7% of them were married. Concerning education, 40% of the elderly participants were illiterates compared to only 4% had university education. Regarding their income, 80% of the elderly participants reported that, their income was sufficient to meet their needs. On the other hand, 18.7 % of them reported that, their income wasn't enough and owed. In relation to their place of residence, over half (50.7 %) of the elderly participants were living in urban areas.

Table (II) Represents the elderly participant's distribution according to their medical history of chronic diseases. The table illustrates that, the most common chronic disease among the studied elderly

was hypertension which affect 74.7% of them with mean duration (9.87±5.14) years followed by diabetes mellitus which affect about two thirds (60.0%) of them with mean duration (10.49±6.96) years. It also illustrates that; cardiovascular disease, liver disease and osteoporosis affect (17.3%, 18.7%, 2.7% respectively). **Table (III):** Shows the elderly participant's distribution according to levels and total score of their beliefs toward medication used in general (BMQ-G) subscales pre, immediate and post implementing the program. Concerning the level of total score BMQ-general, 72.0% of the studied elderly had positive beliefs toward medication used in general before the program implementation which increased to (94.7% and 93.3% respectively) immediately and after implementing the program with three months. Furthermore, there was significant decline on negative beliefs toward medication used in general before, immediate and after implementing the educational program with three months at (P<0.05).

Table (IV): Shows the elderly participant's distribution according to their level and total score of attitude toward medications pre, immediate and 3 months post implementation of the educational program. It represents that, 73.3% of the elderly participants had negative attitude toward medication prior to the program implementation. On the other hand, 93.3% and 85.3% had positive attitude toward medication immediately and 3 months after implementing the program. Furthermore, there was significant improvement of the

studied elderly attitude toward medication pre, immediate and 3 months after implementing the program at (P<0.05).

Table (V): Illustrates elderly participant's distribution according to overall level and total score of subjective norms pre, immediate and 3 months post implementing the educational program. It shows that 77.3 % of the elderly participants had inadequate motivation toward medication use prior to program implementation which changed to 72.0% and 61.3% of the studied elderly who had adequate motivation immediately and 3 months after implementing the program. Moreover, there was major improvement on studied elderly motivation toward medication before, immediate and 3 months post implementing the educational program at (P<0.05).

Table (VI): Displays the elderly participant's distribution according to overall levels and total score of enabling factors pre, immediate and 3 months post implementing the program. This table shows that, 69.3% of the elderly participants had inadequate support in medication management while only 30.7% of them had adequate support before program implementation. On the other hand, immediately after program implementation 72% of the studied elderly had adequate support and only 28.0% of them had inadequate support. These percentages still the same 3 months after implementing the program. Furthermore, there was major improvement of the enabling factors pre, immediate and 3 months post implementing the educational program at (P<0.05).

Table (VII): Displays the elderly participant's distribution according to their overall levels and total score of deficiency in medication management pre, immediate and 3 months post implementing of the educational program. The table illustrates that, 53.3% of the studied elderly had moderate deficiency, while only 5.3% of them had high level of deficiency prior to program implementation. Immediately and 3 months after implementing the program, the majority of the studied elderly (96% and 90.7% respectively) had mild deficiency. Moreover, there was significant difference in overall medication management for elderly deficiencies level pre, immediate and 3 months post implementing the educational program at ($P < 0.05$). **Table (VIII):** shows the correlation between beliefs about medications, attitude toward medications, subjective norms, enabling factors and medication management for elderly deficiencies overall total scores among studied elderly before the program implementation. The table shows that, a significant positive correlation between total attitude scores and overall BMQ-Specific (BMQ-S) had been found prior the program implementation ($P = 0.0001$). Also, there was significant positive correlation between overall enabling factors scores and total attitude scores & overall subjective norms scores prior to program implementation ($P = 0.014$, 0.0001 and 0.001 respectively). On the other hand, a significant negative correlation between overall scores of medication management for elderly deficiencies and total attitude scores, overall subjective norms scores & overall enabling

factors scores was present before program implementation ($P = 0.007$, 0.001 and 0.0001 respectively).

Table (IX): Illustrates the correlation between beliefs about medications, attitude toward medications, subjective norms, enabling factors and medication management for elderly deficiencies overall scores among studied elderly three months after implementation of the educational program. The table reveals that, a significant negative correlation between overall BMQ-general (BMQ-G) and overall BMQ-Specific (BMQ-S) was present 3 months after implementing the program ($P = 0.0001$). Also, a significant positive correlation between total attitude scores and overall score of BMQ-Specific (BMQ-S) was present while a negative correlation between it and BMQ-general (BMQ-G) was present after implementing the educational program ($P = 0.002$ and 0.0001 respectively).

Furthermore, a significant positive correlation between overall enabling factors scores and overall influential motivator scores was present 3 months after implementing the educational program ($P = 0.011$). On the other hand, a significant negative correlation between overall scores of medication management for elderly deficiencies and total attitude score & overall influential motivator score and overall enabling factors scores was present 3 months after implementing the educational program ($P = 0.005$, 0.004 and 0.018 respectively).

Table (I): Distribution the elderly participants according to their sociodemographic characteristics

| Sociodemographic data | The studied elderly with multi-morbidity (n=75) | |
|------------------------------|--|------|
| | N | % |
| Age years | | |
| 60-<70 | 50 | 66.7 |
| 70-≤80 | 25 | 33.3 |
| Range | 60-80 | |
| Mean±SD | 66.88±6.40 | |
| Sex | | |
| Male | 35 | 46.7 |
| Female | 40 | 53.3 |
| Marital status | | |
| Married | 53 | 70.7 |
| Widow | 21 | 28.0 |
| Divorced | 1 | 1.3 |
| Educational level | | |
| Illiterate | 30 | 40.0 |
| Read and write | 19 | 25.3 |
| Elementary education | 5 | 6.7 |
| Secondary education | 18 | 24.0 |
| University education | 3 | 4.0 |
| Job before retirement | | |
| Not working (housewife) | 32 | 42.7 |
| Professional work | 1 | 1.3 |
| Office work | 19 | 25.3 |
| Craftsmanship | 6 | 8.0 |
| Free business | 17 | 22.7 |
| Income | | |
| Enough and save | 1 | 1.3 |
| Enough | 60 | 80.0 |
| Not enough and owes | 14 | 18.7 |
| Place of residence | | |
| Rural | 37 | 49.3 |
| Urban | 38 | 50.7 |

Table (II): Distribution of the elderly participants according to their medical history of chronic diseases

| #Medical history (Type of chronic disease) | The studied elderly with multi-morbidity (N=75) | | | |
|---|--|------|--|------------|
| | Type of chronic disease | | Duration of the chronic disease (Years) | |
| | N | % | Range | Mean±SD |
| Hypertension | 56 | 74.7 | 2-28 | 9.87±5.14 |
| Diabetes Mellitus | 45 | 60.0 | 2-30 | 10.49±6.96 |
| Cardiovascular disease | 13 | 17.3 | 0.5-19 | 6.19±4.96 |
| Liver disease | 14 | 18.7 | 3-20 | 10.50±4.67 |
| Osteoporosis | 2 | 2.7 | 7-8 | 7.50±0.71 |
| Osteoarthritis | 20 | 26.7 | 3-20 | 8.75±5.01 |
| Kidney disease | 18 | 24.0 | 2-10 | 4.56±2.09 |

Table (III): Distribution of the elderly participants according to levels and total score of their beliefs toward medication used in general (BMQ-G) subscales pre, immediate and post implementation of the educational program

| Beliefs toward medication used in general subscales (BMQ-general (BMQ-G)) | The studied elderly with multi-morbidity pre and posttest of the educational intervention (n=75) | | | | | | χ^2 test | P value |
|---|--|------|------------|------|------------|------|---------------|---------|
| | Pretest | | Immediate | | Posttest | | | |
| | N | % | N | % | N | % | | |
| 1-General-Overuse (BMQ-GO) subscale | | | | | | | | |
| ◆Levels of BMQ-GO scores | | | | | | | | |
| Positive belief (<50%) | 61 | 81.3 | 72 | 96.0 | 70 | 93.3 | 10.378 | 0.006* |
| Negative belief (≥50%) | 14 | 18.7 | 3 | 4.0 | 5 | 6.7 | | |
| ◆Total scores of BMQ-GO subscale | | | | | | | | |
| Range | 4-20 | | 4-20 | | 4-20 | | | |
| Mean±SD | 9.27±2.97 | | 6.29±2.59 | | 6.55±2.87 | | | |
| χ^2 value | 58.072 | | | | | | | |
| P value | 0.0001* | | | | | | | |
| 2-General-Harm (BMQ-GH) subscale | | | | | | | | |
| ◆Levels of BMQ-GH scores | | | | | | | | |
| Positive belief (<50%) | 21 | 28.0 | 74 | 98.7 | 71 | 94.7 | 122.172 | 0.0001* |
| Negative belief (≥50%) | 54 | 72.0 | 1 | 1.3 | 4 | 5.3 | | |
| ◆Total scores of BMQ-GH | | | | | | | | |
| Range | 4-20 | | 4-20 | | 4-20 | | | |
| Mean±SD | 12.00±3.64 | | 6.87±2.44 | | 7.25±2.94 | | | |
| χ^2 value | 80.699 | | | | | | | |
| P value | 0.0001* | | | | | | | |
| Overall BMQ-general (BMQ-G) | | | | | | | | |
| ◆Levels of BMQ-S scores | | | | | | | | |
| Positive belief (<50%) | 54 | 72.0 | 71 | 94.7 | 70 | 93.3 | 21.000 | 0.0001* |
| Negative belief (≥50%) | 21 | 28.0 | 4 | 5.3 | 5 | 6.7 | | |
| ◆Total scores of BMQ-S | | | | | | | | |
| Range | 8-40 | | 8-40 | | 8-40 | | | |
| Mean±SD | 21.27±5.71 | | 13.16±4.38 | | 13.80±5.19 | | | |
| χ^2 value | 83.015 | | | | | | | |
| P value | 0.0001* | | | | | | | |

Table (IV): Distribution of the elderly participants according to their levels and total score of attitude toward medications pre, immediate and post implementation of the educational program

| Attitude toward medication | The studied elderly with multi-morbidity pre and posttest of the educational intervention (n=75) | | | | | | χ^2 test | P value |
|--------------------------------|--|------|-----------|------|-----------|------|---------------|---------|
| | Pretest | | Immediate | | Posttest | | | |
| | N | % | N | % | N | % | | |
| •Levels of attitude: | | | | | | | | |
| Positive attitude | 20 | 26.7 | 70 | 93.3 | 64 | 85.3 | 92.025 | 0.0001* |
| Negative attitude | 55 | 73.3 | 5 | 6.7 | 11 | 14.7 | | |
| •Total attitude scores: | | | | | | | | |
| Range | -14 : 14 | | -2 : 14 | | -2 : 14 | | | |
| Mean±SD | -0.61±6.25 | | 9.04±4.11 | | 8.08±4.98 | | | |
| χ^2 value | 81.637 | | | | | | | |
| P value | 0.0001* | | | | | | | |

Table (V): Distribution of the elderly participants according to overall levels and total score of Subjective Norms pre, immediate and post implementation of the educational program

| Overall subjective norms | The studied elderly with multi-morbidity pre and posttest of the educational intervention (n=75) | | | | | | χ^2 test | P value |
|---|--|------|------------------|------|------------------|------|---------------|---------|
| | Pretest | | Immediate | | Posttest | | | |
| | N | % | N | % | N | % | | |
| ●Levels of overall subjective norms adequacy | | | | | | | | |
| Inadequate motivation (<60%) | 58 | 77.3 | 21 | 28.0 | 29 | 38.7 | 40.491 | 0.0001* |
| Adequate motivation (\geq 60%) | 17 | 22.7 | 54 | 72.0 | 46 | 61.3 | | |
| ●Overall subjective norms scores | | | | | | | | |
| Range | 5-30 | | 8-30 | | 8-30 | | | |
| Mean \pm SD | 14.09 \pm 4.91 | | 20.12 \pm 5.55 | | 19.08 \pm 5.24 | | | |
| χ^2 value | 47.321 | | | | | | | |
| P value | 0.0001* | | | | | | | |

Table (VI): Distribution of the elderly participants according to overall levels and total score of enabling factors pre, immediate and post implementation of the educational program

| Overall enabling factors to improve behaviors toward appropriate medication | The studied elderly with multi-morbidity pre and posttest of the educational intervention (n=75) | | | | | | χ^2 test | P value |
|---|--|------|-----------------|------|-----------------|------|---------------|---------|
| | Pretest | | Immediate | | Posttest | | | |
| | N | % | N | % | N | % | | |
| •Levels of overall enabling factors adequacy | | | | | | | | |
| Inadequate enabling factors (support) (<60%) | 52 | 69.3 | 21 | 28.0 | 21 | 28.0 | 35.119 | 0.0001* |
| Adequate enabling factors (support) (\geq 60%) | 23 | 30.7 | 54 | 72.0 | 54 | 72.0 | | |
| •Overall enabling factors scores | | | | | | | | |
| Range | 1-6 | | 3-7 | | 3-7 | | | |
| Mean \pm SD | 2.69 \pm 1.40 | | 4.57 \pm 1.35 | | 4.57 \pm 1.35 | | | |
| χ^2 value | 62.356 | | | | | | | |
| P value | 0.0001* | | | | | | | |

Table (VII): Distribution of the elderly participants according to their overall levels and total score of deficiency in medication management pre, immediate and post implementation of the educational program

| Overall Medication Management Instrument for Deficiencies in Elderly (MEDMAIDE) | The studied elderly with multi-morbidity pre and posttest of the educational intervention (n=75) | | | | | | χ^2 test | P value |
|---|--|------|-----------|------|-----------|------|---------------|-------------|
| | Pretest | | Immediate | | Posttest | | | |
| | N | % | N | % | N | % | | |
| ◆levels of overall medication management for elderly deficiencies | | | | | | | | |
| Mild deficiency (<50%) | 31 | 41.3 | 72 | 96.0 | 68 | 90.7 | 75.430 | 0.0001 * |
| Moderate deficiency (50-70%) | 40 | 53.3 | 2 | 2.7 | 6 | 8.0 | | |
| High deficiency (>70%) | 4 | 5.3 | 1 | 1.3 | 1 | 1.3 | | |
| ◆Overall scores of Medication Management for elderly deficiencies | | | | | | | | |
| Range | 0-12 | | 0-10 | | 0-11 | | | |
| Mean±SD | 5.83±2.96 | | 1.92±1.91 | | 1.95±2.28 | | | |
| χ^2 value | 75.147 | | | | | | | |
| P value | 0.0001* | | | | | | | |

Table (VIII): Correlation between beliefs about medications, attitude toward medications, subjective norms, enabling factors and Medication Management for elderly deficiencies overall total scores among studied elderly before the implementation of the educational program

| Variables total scores | Total scores of the studied elderly with multi-morbidity pretest of the educational intervention (n=75) | | | | |
|--|---|-----------------------------|-----------------------|---------------------------------|---------------------------------|
| | Overall BMQ-Specific (BMQ-S) | Overall BMQ-general (BMQ-G) | Total attitude scores | Overall subjective norms scores | Overall enabling factors scores |
| | R | R | R | R | R |
| | P | P | P | P | P |
| Overall BMQ-Specific (BMQ-S) | - | - | - | - | - |
| Overall BMQ-general (BMQ-G) | -0.115 0.325 | - | - | - | - |
| Total attitude scores | 0.462 0.0001* | -0.138 0.239 | - | - | - |
| Overall influential motivator scores | 0.093 0.430 | -0.182 0.116 | 0.265 0.022* | - | - |
| Overall enabling factors scores | 0.282 0.014* | 0.068 0.564 | 0.471 0.0001 * | 0.320 0.001* | - |
| Overall scores of Medication Management for elderly deficiencies | -0.173 0.139 | 0.078 0.506 | -0.308 0.007* | -0.367 0.001* | -0.540 0.0001* |

Table (IX): Correlation between beliefs about medications, attitude toward medications, subjective norms, enabling factors and Medication Management for elderly deficiencies overall scores among studied elderly three months after implementation of the educational program

| Variables total scores | Total scores of the studied elderly with multi-morbidity after implementation of the educational program (n=75) | | | | |
|--|---|-----------------------------|-----------------------|--------------------------------------|---------------------------------|
| | Overall BMQ-Specific (BMQ-S) | Overall BMQ-general (BMQ-G) | Total attitude scores | Overall influential motivator scores | Overall enabling factors scores |
| | R | R | R | R | R |
| | P | P | P | P | P |
| Overall BMQ-Specific (BMQ-S) | - | - | - | - | - |
| Overall BMQ-general (BMQ-G) | -0.472 0.0001* | - | - | - | - |
| Total attitude scores | 0.347 0.002* | -0.426 0.0001* | - | - | - |
| Overall influential motivator scores | 0.109 0.353 | 0.010 0.932 | 0.125 0.285 | - | - |
| Overall enabling factors scores | 0.083 0.478 | 0.096 0.414 | 0.106 0.366 | 0.294 0.011* | - |
| Overall scores of Medication Management for elderly deficiencies | -0.134 0.253 | 0.126 0.282 | -0.319 0.005* | -0.326 0.004* | -0.272 0.018* |

Discussion

Nowadays, the elderly patients represent an extremely large and constantly consumers of healthcare services. According to the National Institute of Health, the life expectancy of elderly population has been increased dramatically since 1900 The **(National Institute of Health, 2020)**. Unfortunately, this increased life expectancy associated with multi-morbidity and polypharmacy. Polypharmacy in this age group is very dangerous due to the multiple degenerations in the physiological and cognitive functions. This requires greater attention to the medication considerations which in turn help the elderly patients to manage their medications appropriately **(Jan et al., 2012)**.

Conducting this study on multi-morbid elderly patients clarified that, the most common chronic disease among the studied elderly was hypertension which affect slightly less than three quarters of them came after it diabetes mellitus which affect two thirds of them **(table II)**. These findings were consistent with **Abdalla et al., (2021)** who studied health indicators among elderly people with chronic diseases in Beni-Suef and found that, hypertension and diabetes mellitus affected the majority of the studied elderly. As well as, **Chen et al., (2022)** who studied the patterns and determinants of multimorbidity in older adults and found that, the most prevalent chronic diseases among the studied elderly were hypertension and diabetes mellitus.

On the other hand, a study by **Clyne et al., (2017)** who studied beliefs

about prescribed medication among older patients with polypharmacy contradict this finding as it found that, the most prevalent chronic illness among the studied elderly were cardiovascular diseases which was followed by alimentary tract and metabolic diseases affecting more than one quarter of the studied elderly.

Conducting educational programs that based on educational models are more effective in changing behaviors. The current study was conducted using BASNEF model which is a comprehensive educational model that utilized to study behaviors of the elderly participant toward their medications. The commitment with treatment regimen and achievement of proper pharmacotherapy among elderly affected by their beliefs about medication, their attitude toward medications, availability of subjective norms and enabling factors which support them **(Bandehehlahi et al., 2019)**.

Concerning the first item of the BASNEF model (beliefs about medication), the current study revealed that, about four-fifths of the studied elderly had positive beliefs about general-overuse of medication before program implementation which increased to the majority of them who had positive beliefs immediately and three months after implementing the program. As well as, before implementing the program there were less than three quarters of the studied elderly had negative beliefs about general-harm of medication, while the majority of them had positive beliefs about general-harm of medication immediately and three months after implementing the program **(table III)**. Having positive beliefs about

general-overuse and negative beliefs about general-harm of medication could be due to the beliefs of the elderly participants that they take the medications which manage their diseases but in the same time they perceive that taking large number of medications will harm them sooner or later. These previous findings were in contrast with **Clyne et al., (2017)** who found that, most of the study subjects had positive beliefs toward general overuse and general harm of medication, while a small percent of the studied elderly had negative beliefs about them. The contrast between the previous study and the current study, may be attributed to the educational level of the study subjects, where in the current study more than two thirds of the studied elderly were either illiterate or read and write (**table I**) while in the previous study there was around half of the studied elderly had secondary education.

Furthermore, the BMQ specific and BMQ general, showed significant negative correlation between them before, immediately and three months following the program implementation (**table VIII, IX**). This negative correlation between BMQ specific and BMQ general was surprising but clarifies that, the view of the studied elderly toward medication used for particular condition differ from their view toward medication in general. This finding was in contrary with **Wei et al., (2017)** who studied beliefs about medicines and non-adherence in patients with stroke, diabetes mellitus and rheumatoid arthritis in China and found positive correlation between specific-concerns, general-overuse and general-harm of medication.

Regarding the second item of the BASNEF model (attitude toward medication), the current study found that, about three quarters of the elderly participants had negative attitude toward medication before implementing the program. Furthermore, there was significant improvement on studied elderly attitude toward medication immediately and three months after implementing the educational program as the majority of them had positive attitude toward medication immediately and three months after after implementing the educational program (**table IV**). This finding was agreed by **Rakheja et al., (2022)** who studied attitudes toward deprescribing in older adults and caregiver in Canada and found that, the most of the elderly participants has negative attitude toward medication. It also was consistent with **Ozkan et al., (2020)**, who studied knowledge, attitude and behaviors regarding medication use among older people suffering from chronic diseases and found that, more than two-thirds of the elderly participants had negative attitude toward medications.

On the other hand, this finding was inconsistent with **Ting et al., (2023)** who studied knowledge, attitude and influencing factors of home-based medication safety among community dwelling older adults with chronic diseases and found that, slightly less than half of the studied elderly had positive attitude toward medication.

Furthermore, the current study found a significant positive correlation between total attitude scores and overall BMQ-specific (BMQ-S) before program implementation and three months after

implementing the educational program (**table VIII and IX**). This because the people usually form their attitudes from their underlying values and beliefs. So, it is very important to explore the elderly attitude and beliefs about medications especially among multi-morbid elderly and conduct educational programs that help in changing the negative one.

By focusing on the third item of the BASNEF model (subjective norms) which are resembled in spouse, doctor, pharmacist, care giver, friends and mass media. The current study found that, these subjective norms play an important role in appropriate medication use among elderly patients. As it found that, more than three quarters of the studied elderly had inadequate motivation degree toward medication use from these subjective norms before program implementation, while there was significant improvement on studied elderly motivation degree immediately and three months after program implementation (**table (V)**). This might be because of understanding their roles in improving quality of pharmacotherapy and achieving effective medication management system after program explanation.

As a result of the aging process, the elderly people suffer from physiological and cognitive degenerations which require enabling factors to assist them in appropriate pharmacotherapy such as attending educational classes, appropriate economic conditions, health insurance coverage, family member / care giver who help them in proper medication use as well as adequate skills such as reading, writing and calculating skills that help in proper use of medication.

Regarding this, the current study found that, before implementing the program more than two thirds of the elderly participants had inadequate support in medication management. On the other hand, there was significant improvement in the enabling factors immediately and three months after implementing the program (**table VI**).

The previously mentioned items of BASNEF model were not only enough to improve quality of pharmacotherapy, but also the multimorbid elderly patients require to have adequate knowledge about their medication, the correct way of taking them and having adequate facilities to obtain the required medication. So, the current study used medication management instrument for deficiencies among the studied elderly to evaluate the degree of deficiency in the older adult's ability to manage medication in their homes and found that, more than half of them had moderate level of deficiency, while only a small percent of them had high level of deficiency before program implementation. Immediately and three months after program implementation there was significant improvement on it (**tableVII**).

Finding the minority of the studied elderly who had high deficiency level may be attributed to multi-morbidity and its associated polypharmacy which provide them with adequate experience due to daily contact with different types and large numbers of medications daily. **Mortelmans et al., (2020)** who studied deficiencies in medication management encountered by geriatric patients with polypharmacy weren't in the same line

with this finding as they found that, the majority of the studied elderly experience high deficiency in medication management. Furthermore, there was significant difference in medication management deficiencies before, immediately and three months after implementing the program (**table VII**) which was similar to **El Said et al., (2020)** who found statistically significant difference in their total deficiency scores before and after intervention.

Also, the current study found a significant negative correlation between overall scores of medication management for elderly deficiencies, total attitude scores, overall subjective norms scores and overall enabling factors scores before and three months after implementing the program (**table VIII and IX**). This is because the elderly patient who had positive attitude, adequate motivation from their subjective norms and adequate support from their enabling factors had direct effect on decreasing the medication management deficiency.

Finally, this study found that, achieving high quality pharmacotherapy among elderly population is complex and require identifying their beliefs and attitudes toward medications. Moreover, evaluating the effect and availability of the subjective norms and enabling factors that help them in safe and appropriate medication use. As well as, identifying the medication management deficiencies among them. This can be achieved through conducting health education programs based on BASNEF educational model which reflect improvement in beliefs, attitude, subjective norms and enabling

factors among the studied elderly by the nurses continuously in every contact for the multimorbid elderly patients with the health care facilities (**Goto et al., 2023 & Yu-Ting et al., 2023**).

Conclusion

Based on the findings of the present study, it can be concluded that, the BASNEF model based educational program was effective in improving the elderly patients' beliefs about medication, their attitude toward medication, overall influential motivator for appropriate medication use and the enabling factors which support them.

Recommendations

Based on the results of the present study the following recommendations were suggested:

1. Community health nurses should assess the elderly beliefs, attitude, subjective norms and their enabling factors and try to correct them because they have direct effect in proper medication use especially among elderly with multi-morbidity.
2. Community health nurses should conduct health education programs based on BASNEF model about safe medication use among multi-morbid elderly.
3. Community health nurses should create materials for health education such as booklets and brochures about safe medication use for multi-morbid elderly using plain language and images which are appropriate for the elderly.
4. Conducting training programs about medication considerations in the health facilities for nurses to improve their care for multi-morbid elderly.

5. Mass media awareness programs required to disseminate information about safe medication use among elderly with multi-morbidity.
6. Greater emphasize should be given to medication reconciliation that facilitate accurate communication of medication information at time of transition between health care facilities.
7. Expanding awareness and further researches about new technologies which help the elderly patient in safe medications use.

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