

Effect of Health Promoting Life Style Model on Self-Efficacy for Patient with Metabolic Syndrome

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Abstract

Background: Metabolic syndrome" MetS " is defined as a cluster of glucose intolerance, hypertension, dyslipidemia and central obesity with insulin resistance as the source of pathogenesis. MetS is considered as lifestyle disorder because poor dieting and lack of regular physical activity lead to insulin resistance or insulin resistance-linked obesity, a condition where the body's cells are incapable of taking up glucose from the blood. **Aim of the study::** This study aimed to evaluate the effect of implementing health promoting life style model on self-efficacy for patient with metabolic syndrome. **Subjects and Methods: Research design:** A quasi experimental design was used. **Setting:** This study was conducted at medical unit and diabetic out-patients clinics affiliated to Zagazig University Hospitals which is located at Sharquia Governorate, Egypt. **Subjects:** A purposive sample of 100 adult patients with type 2 diabetes mellitus, 50 randomly allocated to each group study and control. **Tools of data collection:** Structured interview questionnaire, Self-rated abilities for health practices (Health self-efficacy measure) scale, and Health-Promoting Lifestyle Profile) questionnaire. **Results:** Most (92%) of the studied groups pre-test were having low self-efficacy (≤ 37.3), while majority (80%) of the studied groups post-test were having high self-efficacy (≥ 74.6). There was a positive highly significant correlation coefficient between total health-promoting lifestyle and self-efficacy among studied patients posttest ($r = 611$ at $p = .000$). Also , there was a positive correlation coefficient between total self-efficacy and total knowledge among studied patients posttest ($r = 593$ at $p = .000$). **Conclusion:** The implementation of Health Promoting Life Style Model for patients with MetS had a statistically significant positive effect on improving study group patients' knowledge, self-efficacy and health promoting behaviors versus to control group, which supported the proposed hypothesis. **Recommendations:** Further self-efficacy and health-promoting behavior training programs for MetS patients should be conducted.

Key words: Health Promoting Life Style, Metabolic Syndrome, , Self-Efficacy.

Introduction:

Diabetes rates in Egypt have increased dramatically, exceeding international rates. Egypt now ranks eighth in the world for disease. Diabetes is a rapidly growing health problem in Egypt with a significant impact on morbidity, mortality and health resources. Currently, the prevalence of type 2 diabetes in Egypt is approximately 15.6% of all adults aged 20-79 years. ⁽¹⁾.

Metabolic Syndrome (MetS) is recognized as a worldwide epidemic disease that is being exacerbated by the increasing prevalence of physical inactivity and obesity. MetS is primarily associated with modifiable risk factors associated with an unhappy lifestyle, including high-calorie food intake,

physical inactivity, smoking, alcohol consumption, and stress ⁽²⁾.

The International Diabetes Federation defines MetS as people with central obesity (defined as a waist circumference (WC) of 80 cm for women and 94 cm for men) ^(3,4,5). In addition, MetS is defined as the presence of at least 3 of the following conditions: abdominal obesity, high triglycerides (TG), low high-density lipoprotein cholesterol, hypertension, and hyperglycemia. MetS also relates to a group of risk factors for cardiovascular disease, type 2 diabetes, myocardial infarction, stroke, prothrombotic condition, atherosclerosis, micro- and

macrovascular complications, and decreased insulin sensitivity^(6,7).

Without prevention and treatment of MetS there is an increased risk of developing diabetes, prediabetes and cardiovascular disease, stroke, especially in the presence of complicating factors including (obesity, restricted physical activity and poor glycemic control). In addition, MetS patients also experience a high level of stress. and decreased quality of life⁽⁸⁾. Lifestyle adjustments required multiple factors such as education, exercise, healthy diet, and pharmacological strategies, which have been considered compelling guidelines for the treatment and prevention of metabolic syndrome^(9,10).

Unhealthy behaviors such as sedentary lifestyle and unbalanced diet combined with genetic factors are the main causes of metabolic syndrome. Global guidelines for MetS recommend that MetS treatments include lifestyle improvement. Among healthy behaviors, increasing muscle mass through regular physical activity improves MetS symptoms by reducing insulin resistance and weight control. In addition, balanced dietary habits prevent complications of metabolic syndrome. Lifestyle modification requires consideration of influencers including knowledge, attitude, social support and self-efficacy, each associated with healthy behavior^(11,6).

Lifestyle is closely linked to various metabolic and cardiovascular diseases such as coronary artery disease, type 2 diabetes and metabolic syndrome⁽²⁾. The Health Promotion Model (MPH) is commonly used to encourage lifestyle changes. Lifestyle intervention, particularly exercise, is recommended as the primary intervention for treating metabolic syndrome⁽¹²⁾. Health promotion, reflected in a healthy lifestyle, is an integral part of disease prevention. Health-promoting behaviors have not only been associated with better physical and

mental health outcomes, but also with lower healthcare costs⁽¹³⁾.

Self-efficacy is defined as confidence in one's ability to perform a particular behavior and should affect the likelihood that the behavior will occur^(14,15). Health self-efficacy is an important indicator of a healthy lifestyle. Self-efficacy interventions have been shown to be effective in promoting health behaviors in critically ill people⁽¹⁶⁾. Self-efficacy is an important factor influencing self-management behavior in diabetes. In DM, self-efficacy refers to the assessment of the patient's ability to establish and follow diabetes-related activities, with a focus on diet, exercise, medication, and diabetes control. blood sugar. The DM-related self-efficacy framework has been applied in various educational programs⁽¹⁷⁾.

Significance of the study:

Metabolic syndrome (MetS) has become a global epidemic. MetS is known to be a risk factor associated with increased incidence of diabetes, hypertension, cerebrovascular and cardiovascular diseases, and various cancers, as well as all-cause mortality. People with MetS would be twice as likely to develop cardiovascular disease as healthy people and 3.5 to 5 times more likely to develop diabetes. Given these associations of MetS with serious complications, effective interventions are needed^(11,9). The comprehensive management of risk factors is very important for improving personal and public health. However, recent studies have focused on the role of metabolic syndrome as a risk factor for CVD; its importance in predicting diabetes is often overlooked⁽⁷⁾. Along with the negative consequences of an unhealthy lifestyle, metabolic syndrome increases the risk of cardiovascular disease, diabetes, cancer and even cancer. Consequently, metabolic syndrome represents a significant

public health burden worldwide ⁽²⁾. Hopefully the results of this study will help provide predictive data that could support nursing practice and research.

Aim of the study

The aim of this study was to evaluate the effect of implementing health promoting life style model on self-efficacy for patient with metabolic syndrome.

This aim was fulfilled through the following objectives:

- Assess the patients' knowledge level regarding metabolic syndrome.
- Assess self-efficacy for patients with type 2 diabetes mellitus.
- Assess the health promoting behavior for patients under the health promotion model.
- Design, implement, and evaluate the effectiveness of health promoting life style model on self-efficacy for patient with metabolic syndrome.

Research Hypotheses

To achieve the purpose of this study, the following research hypotheses were formulated:

H1: The mean knowledge scores of patients post-program will be higher than that of their pre-program scores.

H2: Significant improvement in self- efficacy and health promoting behaviors for patients in study group after implementation of Health promoting life style model.

.Operational definitions:

Health Promotion Model: is a middle-range theory that provides a holistic conceptual framework for understanding the engagement of health promotion behaviors This model recognizes that an individual's adoption of health promoting behaviours is primarily influenced by their behavioral cognition and affect, which also interact with their traits and experiences.

Subjects and Methods:

Research Design:

A quasi-experimental research design (pretest-posttest) was used to conduct the study. Quasi-experimental design is a useful tool in situations where true experiments cannot be used for ethical or practical reasons as non-random method is used to assign subjects to groups (Thomas ,⁽¹⁸⁾.

Study Setting:

The current study was carried out in medical unit and diabetic out-patients clinics attached to Zagazig University Hospitals in Sharquia Governorate, Egypt. The medical unit on the fourth floor had three bedrooms, 11 beds for men and 18 beds for women.

Study Subjects:

A purposive sample of 100 adult patients , drawn from all the patients at medical units and diabetic out-patients clinics at Zagazig University Hospitals from March 2021 to September 2021. The study subjects were divided into two equal groups, the study group (50 patients) and the control group (50 patients).

The sample was calculated by power and sample size calculation program to give power of 80%. These patients were consecutively enrolled upon admission to the outpatient. The inclusion criteria were patients being diagnosed as type 2 diabetes mellitus for at least six months,, Patients between 30-60 years of age, both sexes , presence of abdominal obesity and hypertension , free from any cognitive or hearing disorders and able to comprehend instructions, accept to participate in the study, also the patients suffering from diabetic complications and attended to previous diabetes education were excluded. Only the study group received health promoting life style model "intervention program ",and control group received the routine care .

Tools of data collection:

Tool I: Structured interview questionnaire:

It was designed by the researcher based on literature review and opinions of expertise for content validity. It was translated into Arabic form to avoid misunderstanding, It was applied to all patients in study and control groups before (pretest) and after (posttest) implementation of the training program. The questionnaire covered four main parts as the following:

Part I: Demographic characteristics:

It included 9 items of personal demographic characteristics of the patients such as age, gender, marital status, level of education, occupation, residence, income, living status, and smoking.

Part II : Patient's health history : it was used to assess patient's health history, covered past, and present health medical history. It involved 6 questions about the medical history of the patients related to diagnosis, onset of disease ,use of hormonal therapy , use of contraceptive pills, presence of ovarian cysts and uterine fibrosis , and other health problems .**It was adapted from Raznahan et al** ⁽¹⁹⁾.

Part III: Anthropometric and serological evaluation (Pre/ Post –test):It included height ,weight , Body mass index "BMI", Random blood sugar ,and diagnostic Criteria for MetS which includes waist circumference, blood pressure, blood glucose level, total cholesterol, high-density lipoprotein cholesterol (HDL-C) and triglycerides . It was adapted from **Saklayen** ⁽³⁾ , **Alberti et al** ⁽²⁰⁾ , and **Ah Shin et al.** ⁽⁷⁾.

Part IV: Patient knowledge regarding Metabolic Syndrome (Pre/ Post –test): It was used to assess current patient's knowledge regarding metabolic syndrome. It was applied in both groups (study and control); and filled in by the researchers; It was consisted of 25 questions(20 MCQ and five true and false questions) about metabolic syndrome such as definition,

causes, ,risk factors, sign and symptoms, evaluation criteria of MetS, complications ,line of treatment, nursing management. It was adapted from **Wang et al** ⁽²¹⁾.,and **NEHA et al** ⁽²²⁾.

The scoring system:

The total score of the knowledge was 41 grades. Scoring of questions (3,7,12,13,15,20) each correct option had score one grade. The other questions, each question had one correct answer, if the patient answer was correct scored one grade and zero for in correct answer or I don't know. Knowledge level was considered satisfactory at cut of point $\geq 60\%$ and it was considered unsatisfactory at cut of point $< 60\%$ based on statistical analysis.

Tool II: Self-rated abilities for health practices (A health self-efficacy measure) scale:

It was adopted from **Becker et al.** ⁽²³⁾. It included 28-item for measure self-efficacy in implementing the four aspects of behaviors: nutrition (7 items), exercise (7 items), psychological well-being (7 items), and health Practices (7 items). Each item has 5 point choice rating from 0= "not at all" to 4 "completely". The scores range from 0 to 112. High self-efficacy ≥ 74.6 , moderate self-efficacy 37.5-74.6,and low self-efficacy ≤ 37.3 .Higher score indicate higher level of self-efficacy in performing health promoting behavior. Nutrition: Items 1-7 Psychological Well Being: Items 8-14 Exercise: Items 15-21 Health Practices: Items 22-28.It was applied in study group (Pre/ Post –test).

Tool III: Health-Promoting Lifestyle Profile II) questionnaire:

It was adopted from **Walker, et al.** ⁽²⁴⁾ to measure the health promoting behavior under the health promotion model. The items included on each scale are as follows: Health-Promoting Lifestyle (52 items), Health Responsibility (9 items), Physical Activity (8 items), Nutrition (9 items),

Spiritual Growth (9 items), Interpersonal Relations (9 items), and Stress Management (8 items). Each item has four choices, rating as 1 = never, 2 = sometimes, 3 = frequently, and 4 = routinely. A score for overall health-promoting lifestyle is obtained by calculating a mean of the individual's responses to all 52 items; six subscale scores are obtained similarly by calculating a mean of the responses to subscale items. The use of means rather than sums of scale items is recommended to retain the 1 to 4 metric of item responses and to allow meaningful comparisons of scores across subscales. The sum score range from 52-208. A higher score indicates a better implementation of health promotion behavior. It was applied in study group (Pre/Post-test).

Validity and Reliability :

Validity of the proposed tools by using face and content validity. Face validity aimed at inspecting the items to determine whether the tools measure what supposed to measure. Content validity was conducted to determine whether the content of the tools cover the aim of the study. Tools were revised by five experts in each specialty & academic position "two of them professors and three assistant professor of medical surgical nursing" who reviewed the tool's content for clarity, relevance, comprehensiveness, understanding, and ease for implementation. According to their opinions, minor modifications were done and the final form was developed. The reliability of the tools was tested using the internal consistency method. It was found that Cronbach's alpha reliability coefficient was 0.821 for Patient knowledge regarding Metabolic Syndrome, Self-rated abilities for health practices (A health self-efficacy measure) scale was reliable at 0.863, while Health-Promoting Lifestyle Profile questionnaire was 0.814.

Pilot study:

A pilot study was carried out on 10 patients (10%) of the total study sample to test the clarity and practicability of the tools and to estimate the needed time to fill in each form. Necessary modifications were done according to the pilot study results. Pilot subjects were later excluded from the main study sample.

Field work:

Approval was taken by official letters to directors of medical hospital and diabetic outpatient clinic before starting application of study plan and was informed about time and date of data collection. Content validity and reliability tests were done before starting of data collection. Data collection as pre/post was done by the researchers available 3 days / week at morning and afternoon shift in study setting. The data were collected by researchers prior to conducting the Health Promoting Life Style Model "intervention program" to have base line data about patient condition.

The study was carried out through four phases: preparatory, planning, implementation, and evaluation. These phases were carried out over a period of eight months from the beginning of March 2021 to the end of September 2021

Preparatory phase:

This phase was pertaining to construction of the study tools and production of the program. Development of the Health Promoting Life Style Model "intervention program" based on analysis of the collected data. It was developed by the researcher guided by reviewing the most recent related literature (Cortez et al. ⁽⁴⁾, Abd Elgafar & Abd El Gafar ⁽¹⁾, Vahedi et al. ⁽²⁵⁾, and Emiral et al. ⁽²⁶⁾), it was written by simple Arabic language and contained pictures for more illustrations to facilitate patients' understanding. The program included the necessary information related to metabolic syndrome definition, risk factors, causes, diagnostic criteria,

investigations, prevention and management. During this phase the researcher will interview each patient after his/her admission to collect baseline data regarding demographic characteristics, patient health history and patient' knowledge assessment questionnaire using tool (1) before explaining the program. each patient asked to fill the interview questionnaire was prepared in a simple Arabic language as a pretest. The tool took 15-20 minutes to be filled. Determined patients' needs were based on answer of each patient in the previous tool. The patients' telephone numbers will be obtained at the first time for contacting them to determine the other appointments in order to complete data collection process.

Planning phase:

Health promoting life style model "intervention program ", regarding metabolic syndrome was designed according to predetermined real patients' needs. The content met patients' needs

General objective:

The general objective of the health promoting life style model "intervention program "was to improve knowledge , practice "self-efficacy" and health promotion behaviour for patient with metabolic syndrome .

Specific objectives:

By the end of the health promoting life style model "intervention program ", the metabolic syndrome patients should be able to define the metabolic syndrome, enumerate the risk factors and causes of metabolic syndrome ,identify the signs and symptoms of metabolic syndrome, identify the required investigations and diagnostic criteria of metabolic syndrome, list complications associated with metabolic syndrome, discuss methods of prevention of metabolic syndrome, and explain health

promoting life style model practice that can be managed by patients.

Implementation phase:

The researchers prepared the instructional program supported with colored booklet containing all the information and skills related to metabolic syndrome using Arabic language; all the content of booklet was explained in details to all patients. by the using of power point presentation as well as posters. The developed program were implemented in the form of sessions carried out in the study settings for the patients in the study group over three days per week (Saturday, Monday and Wednesday). The study group patients were distributed into small groups including 10 patients in each group. The content of the program was distributed over 7 consecutive sessions, including theoretical and practical part. Duration of each session take 40-45 minutes.

The first session was for orientation to clarify aim and contents of the program, its general objectives, the teaching methods, learner's activities, and evaluation methods. two session covered the theoretical part of the program ,one session about definition causes, risk factors, clinical manifestation, complications, medical treatment regarding metabolic syndrome, and one sessions about healthy weight and how maintain ideal body weight, healthy nutrition, smoking cessation strategies, and strategies for prevention of diabetes mellitus. ,strategies for prevention of elevation of cholesterol in blood.

Four sessions covered practical part regarding health promoting life style model practice that can be managed by patients which include how to measure body weight , Height, Body mass index (BMI), Waist circumference, how to measure blood pressure, Random blood sugar, types of

exercises (various exercise which help promoting healthy weigh and aid for weight reduction), importance of exercise. Moreover, the researchers handed the booklet of guidelines to each patient in study group.

Evaluation phase:

Is the last phase carried out to both groups after two months from implementation of the program to evaluate its effect by the using of the same pre-test tools for knowledge , Self-related ability (self-efficacy) scale, and Health-Promoting Lifestyle Profile II) questionnaire life . The researchers evaluated the control group firstly and then the study group to achieve fairness of the results. Each patient was evaluated via scheduling meeting with them at the same day for his/her follow up appointment.

Ethical considerations and administrative design:

Before the initial interview, an oral consent was secured from each subject after being informed about the nature, purpose and benefits of the study. Patients were also informed that participation is voluntary and about their right to withdraw at any time without giving reasons. Confidentiality of any obtained information was ensuring through coding of all data. The researchers reassured patients that the data would be used for only the research purpose. The control group received the same program at the end of the study.

Statistical analysis -

The collected data organized, tabulated and statistically analyzed using Statistical Package for Social Science (SPSS) version 25 for windows, running on IBM compatible computer. Descriptive statistics were applied (e.g., frequency, percentages, mean and standard deviation). Qualitative variables were compared using qui square test (χ^2) as the test of

significance, and independent (t) test was used to compare mean score between two groups. Correlation coefficient test (r) was used to test the correlation between studied variables. Reliability of the study tools was done using Cronbach's Alpha. A significant level value was considered when $p < 0.05$ and a highly significant level value was considered when $p < 0.01$. No statistical significance difference was considered when $p > 0.05$.

RESULTS

Table (1): Shows that the mean and standard deviation of age of the patients in the study group and in the control group was 52.63 ± 7.09 , 53.11 ± 6.82 years respectively, Less than three quarters (70 %)of patients in the study group and more than half (56%) of patients in the control group were females .Most of the studied subjects were educated and did not have cigarette smoking. Finally, there was no statistically significant differences between both groups(p value > 0.05).

Table (2): Reports that more than half (60 %, 56 % respectively) of patients in the study and control groups were less than 5 years regarding onset of disease . All (100%) of them have DM Type II , obesity , and hypertension . (64 % , 68 % respectively) of patients in the study and control groups having cardiovascular disease. Finally, there was no statistically significant differences between both groups(p value > 0.05).

Table (3): reveals that two fifths (40%) of study subject in the study and control group was overweight in preprogram phase, while in post program phase less than three quarters (70%) of patients in study group was healthy weight compared to nearly more than two fifths (42%) of patients in control group was overweight .

Table (4): Demonstrates that there were high statistically significant differences between study and control groups post intervention (χ^2 15.91 for men and χ^2 13.41 for women at ($P \leq 0.01$, χ^2 20.36 at $P \leq 0.01$, χ^2 21.88 at $P \leq 0.01$, χ^2 16.95 for men and χ^2 16.01 for women at $P \leq 0.01$, χ^2 18.97 at $P \leq 0.01$ respectively) regarding waist Circumference , blood pressure level , FBG level , HDL cholesterol, and elevated triglyceride defined.

As shown in Table 5, there was no statistical significant difference between two groups at pre intervention (χ^2 0.521 at $p > 0.05$), while in post intervention a highly statistical significant difference was found in both study and control groups regarding knowledge level about metabolic syndrome (χ^2 16.08 at $p \leq 0.01$).

Table (6) Reveals that there were high statistically significant differences between pretest and posttest of the study group regarding Self-related ability (self-efficacy) (χ^2 27.11 at $P \leq 0.01$).

Table (7): Reveals that Most (92 %) of patient in the study group were having low self-efficiency pretest, while majority (80%) of the them were having high self-efficiency post-test.

Table (8): shows there were high statistically significant differences between pretest and posttest of the study group regarding health-promoting lifestyle (t 31.96 at $P \leq 0.01$). The mean score and standard deviation of total health-promoting lifestyle behavior of the study group post intervention was 167.53 ± 18.1 compared to 86.44 ± 12 . in pre intervention phase .

Table (9): illustrates that there was a positive highly significant correlation coefficient between total promoting lifestyle and self-efficiency among studied patients posttest ($r = 611$ at $p = .000$). Also , there was a positive correlation coefficient between total self-efficiency and total

knowledge among studied patients posttest ($r = 593$ at $p = .000$).

Discussion:

Lifestyle changes, such as regular exercise, healthy diet, and weight control, are recommended as first-line interventions for the management of MetS . All of these lifestyle changes involve behavioral changes. about the prevention and treatment of metabolic syndrome would facilitate people's adaptation to healthy behaviors. Hospitals are expected to take on the role of providing MetS education to patients, as they understand that patient knowledge of MetS will not only inform health education services in clinical practice and provide suggestions for improvement. More importantly, the results would help healthcare professionals determine what educational efforts are needed. Wang et al.,⁽²¹⁾

Concerning the demographic characteristics of the studied subjects, the present study reported that the mean age of the studied subjects was more than fifty years . Less than three quarters in the study group and more than half in the control group were female. This may be due to that the prevalence of metabolic syndrome is increased in middle- or older-aged. Also, it has been reported that technology, automation and a more comfortable lifestyle encourage sedentary behavior, increase in consumption of high calorie-low fiber fast food.

This results was in the same line of Raznahan et al. ,⁽¹⁹⁾ in the study entitled "The Effect of Teach-Back Method on Health Promoting Lifestyle of Patients With Type 2 Diabetes" who mentioned that more than half of study sample was around the age of 40- 59 years old and more than half of them were female .This result was not supported by Mohamed, et.al.,⁽²⁷⁾ in the study entitled " Effect of Applying Health Belief Model on

Type 2 Diabetic Patients' Knowledge, Self-Care Practices and Health Beliefs "reveals that the mean age of the studied subjects was nearly more than forty years .

Concerning the Patient's health history of the studied groups : the current study reported that more than half of patients in the study and control groups are less than 5 years regarding onset of disease . This finding was supported by Raznahan et al. ,⁽¹⁹⁾ in the study entitled "The Effect of Teach-Back Method on Health Promoting Lifestyle of Patients With Type 2 Diabetes" who mentioned that nearly less than half of study subject in the intervention and control group was more than 4 years regarding history of diabetes .also the current study revealed that all of study subject in the study and control groups having hypertension. This finding was supported by Sreedevi et al. ,⁽²⁸⁾ in the study entitled "Uncontrolled Blood Pressure and Associated Factors Among Persons With Diabetes: A Community Based Study From Kerala, India" who reported that nearly more than half of study sample having hypertension.

Regarding Anthropometric and serological evaluation of the studied groups. The current study demonstrated that there were high statistically significant differences between study and control groups post intervention for women and men regarding waist Circumference , blood pressure level , FBG level , HDL cholesterol, and elevated triglyceride defined. This results was in agreements with Ibrahim et al.,⁽⁹⁾ in the study entitled " Effectiveness of Nurse-Led Lifestyle Intervention on Outcomes of Metabolic Syndrome Patients "they reported that there is statistical difference between pre and post regarding hypertension and high significance difference regarding FBG level .

As respect to total knowledge at pre and post intervention. The present study illustrated that a highly statistical significant

difference was found in study group post intervention regarding knowledge level about metabolic syndrome ,also , illustrated that the mean and standard deviation of knowledge scores of patients in the study group post-program was 19.80 ± 3.53 compared to 3.98 ± 1.02 in the control group post program. The finding confirmed the crucial need for patient health promoting life style model intervention program . Mohamed, et.al.,⁽²⁷⁾ in the study entitled " Effect of Applying Health Belief Model on Type 2 Diabetic Patients' Knowledge, Self-Care Practices and Health Beliefs " goes in the same line with the current study who illustrated that pre-application of HBM educational intervention revealed that nearly less than most of the patients showed a poor score level of knowledge .However, post intervention of HBM application, most of them showed a good score level of knowledge.

From the researcher point of view this data reflect importance of health promoting life style model intervention program, which determined the intervention as a main independent predictor of the improvement of knowledge , also education level and employment status were found to influence the scoring of K-MS. This point of view was supported by Feltracco, et al.⁽²⁹⁾ in the study entitled " Blood loss, predictors of bleeding, transfusion practice and strategies of blood cell salvaging during liver transplantation" stated that patients' education is a broad and intended learning practice that is achieved by long-term learning ways, counseling and behavioral change skills that proposed to improve the patient's knowledge and health behavior.

Regarding to mean and standard deviation about Self-rated ability (A health self-efficacy measure) scale the present study demonstrated that there were high statistically significant differences between pretest and posttest of the study group

regarding Self-related ability (self-efficacy) . The mean and standard deviation score of total self- efficacy of the study group post intervention was 92.32 ± 13.7 compared to 24.49 ± 5.21 in pre intervention phase . This could be due to that self-efficacy plays a basic and essential role in improving a healthy lifestyle. The increase in self-efficacy as a result of this short-term intervention was considered to be due to patients thinking they could easily perform activities which were expected of them because of knowledge gained about managing their illness by changing Health promoting life style behaviour.

This results was in harmony with Zheng et al.,⁽²⁾ in the study entitled "The effects of a nurse-led lifestyle intervention program on cardiovascular risk, self-efficacy and health promoting behaviours among patients with metabolic syndrome: Randomized controlled trial" supported the present finding by revealing that total mean score of self-efficacy in the intervention group after 3 months was 82.29 ± 16.37 and there was a significant improvements in self-efficacy to health promoting behaviours.

Regarding Levels of self-efficacy of the study group at pre and post intervention. The present study stated that most of patient in the study group had low self-efficiency pretest compared to majority of the them had high self-efficiency post-test. this finding goes in the same line with Ibrahim et al. ,⁽⁹⁾ in the study entitled " Effectiveness of Nurse-Led Lifestyle Intervention on Outcomes of Metabolic Syndrome Patients "they showed that majority of study sample had high self-efficiency post-test compared to most of patient in the study sample had low self-efficiency pretest.

As respect to the mean of the health-promoting lifestyle behavior among the studied patients pre and post application,

the current study showed the mean score and standard deviation of total health-promoting lifestyle behavior of the study group post intervention was 167.53 ± 18.1 compared to $86.44 \pm 12.$ in pre intervention phase, there were high statistically significant differences between pretest and posttest of the study group regarding health-promoting lifestyle .This could be due to that health promotion model has been widely applied in guiding the development of tailored lifestyle interventions among different populations and lifestyle modification is the first-line intervention for metabolic syndrome management, and adopting healthy behaviors is fundamental line for care among patients with metabolic syndrome.

This results was in the same line of Raznahan et al. ,⁽¹⁹⁾ in the study entitled "The Effect of Teach-Back Method on Health Promoting Lifestyle of Patients With Type 2 Diabetes" who mentioned that there were high statistically significant differences between pretest and posttest of the intervention regarding health-promoting lifestyle, also supported by Ibrahim et al. ,⁽⁹⁾ in the study entitled " Effectiveness of Nurse-Led Lifestyle Intervention on Outcomes of Metabolic Syndrome Patients" showed that there was a statistical significant difference between the pre-test and post-test of the studied subjects regarding health-promoting lifestyle behavior.

Concerning Correlation between knowledge , self-efficacy and health promoting lifestyle at pre and post intervention among the study group. The current study illustrated that there was a positive highly significant correlation coefficient between total promoting lifestyle and self-efficiency among studied patients posttest .This could be due to that health-related self-efficacy is a basic motivator for one to continue

physical activity; hence, it serves as significant determinant of healthy lifestyle promotion. This finding was in harmoniousness with Chen et al.,⁽⁶⁾ in the study entitled "Correlates Between Health Beliefs and Health-Promoting Lifestyle Profiles in the Development of Metabolic Syndrome in Taiwan" who found that there was a marked correlation between HPLP-S items and Self-Efficacy. As well as, this finding is similar to finding of Ibrahim, et al.,⁽⁹⁾ in the study entitled " Effectiveness of Nurse-Led Lifestyle Intervention on Outcomes of Metabolic Syndrome Patients" they illustrated that there was a statistical significant correlation between metabolic syndrome and health-promoting lifestyle behavior among studied patients, and there was a statistical significant correlation between metabolic syndrome and self-efficiency among studied patients .

The current study also mentioned that there was a positive correlation coefficient between total self-efficiency and total knowledge among studied patients posttest. This results was supported by Taha et al.,⁽¹⁷⁾ in the study entitled" Impact of a health educational guidelines on the knowledge, self-management practice and self-efficacy of patients with type-2 diabetes" they stated

that there was a positive significant correlation between knowledge and self-efficacy.

Conclusion

Based on the results of the present study, it can be concluded that the implementation of Health Promoting Life Style Model for patients with MetS had a statistically significant positive effect on improving study group patients' knowledge, self-efficacy and health promoting behaviors versus to control group, which supported the proposed hypothesis.

Recommendations

- The study recommends the need to ensure the implementation of the lifestyle change program for health promotion by nurses as routine care for patients with metabolic syndrome and to motivate nursing patients to adhere to lifestyle changes as a key factor in reducing the components of metabolic syndrome
- Further self-efficacy and health-promoting behavior training programs for MetS patients should be conducted on a large number of subjects related to evidence of outcomes and generalizability.

Table (1): Frequency and Percentage Distribution of Demographic Characteristics of The Study and Control groups (n=100).

Demographic Characteristics	Study group (n=50)		Control group (n=50)		X ²	P-Value
	No.	%	No.	%		
Age (Year)						
30-<40	5	10.0	4	8.0	1.021	0.401
40-<50	15	30.0	13	26.0		
50-<60	20	40.0	24	48.0		
≥60	10	20.0	9	18.0		
x̄ S.D	52.63±7.09		53.11±6.82		t=0.989	0.386
Gender						
Male	15	30.0	22	44.0	1.231	0.357
Female	35	70.0	28	56.0		
Marital Status						
Married	20	40.0	18	36.0	0.507	0.801
Not married	30	60.0	32	64.0		
Educational level						
Educated	47	94.0	45	90.0	0.701	0.411
Not educated	3	6.0	5	10.0		
Occupation:						
Working	25	50.0	22	44.0	0.217	0.966
Not working	25	50.0	28	56.0		
Residence						
Rural	30	60.0	33	66.0	0.391	0.732
Urban	20	40.0	17	34.0		
Income						
Sufficient	25	50.0	22	44.0	0.205	0.973
Insufficient	25	50.0	28	56.0		
Living status						
With family	48	96.0	48	96.0	0	0
Without family	2	4.0	2	4.0		
Smoking						
Yes	3	6.0	5	10.0	0.201	0.857
No	47	94.0	45	90.0		

X²: Chi-square No statistically significant at p > 0.05.

Table (2): Comparison of Patients' Health History In The Study and Control groups (n=100).

Items	Study group (n=50)		Control group (n=50)		X2	P-Value
	No.	%	No.	%		
Diagnosis:						
DM Type II	50	100.0	50	100.0	0	0
Onset of disease						
<5 year	30	60.0	28	56.0	0.521	0.352
5-<10 years	15	30.0	14	28.0		
≥10 years	5	10.0	8	16.0		
Using of hormonal therapy						
Yes	5	10.0	3	6.0	0.287	0.933
No	45	90.0	47	94.0		
Using of contraceptive pills (n=35♀)						
Yes	8	22.9	6	17.1	0.290	0.925
No	27	77.1	29	82.9		
Presence of ovarian cysts or uterine fibrosis (n=35♀)					0.307	0.900
Yes	8	22.9	5	14.3		
No	27	77.1	30	85.7		
Other health problems						
Obesity	50	100.0	50	100.0	0.624	0.469
Hypertension	50	100.0	50	100.0		
Cardiovascular disease.	32	64.0	34	68.0		
Cerebrovascular accident "Stroke"	15	30.0	18	36.0		
Renal disease	8	16.0	10	20.0		
Cancer	10	20.0	13	26.0		
Cataract	8	16.0	5	10.0		

X²: Chi-square No statistically significant at p > 0.05.

Table (3): Patients' Anthropometric and serological evaluation In The Study and Control groups (n=100).

Anthropometric and serological evaluation	Study group (n=50)				Control group (n=50)				P ₁	P ₂	
	Pre		Post		Pre		Post				
	No.	%	No.	%	No.	%	No.	%			
Height " CM "									X ² =1.014	X ² =1.014	
140-<150	10	20.	10	20.	8	16.	8	16.0	p=0,273	p= 0,273	
150-<160	28	0	28	0	27	0	27	54.0			
≥160	12	56.	12	56.	15	54.	15	30.0			
		0	0			0					
		24.	24.			30.					
		0	0			0					
		X²= , P= 0				X²= , P= 0					
Weight "Kg"									X ² =0.937	X ² =13.47	
50-<60	8	16.	14	28.	7	14.	9	18.0	p= .455	p=.001**	
60-<70	14	0	30	0	16	0	16	32.0			
≥70	28	28.	6	60.	27	32.	25	50.0			
		0	0			0					
		56.	12.			54.					
		0	0			0					
		X²= 12.04, P= .001**				X²= 0.521, P= 0.374					

									$X^2=0.409$	$X^2=15.99$	
Body Mass Index											
< 18.5 Under weight	0	0.0	0	0.0	0	0.0	0	0.0	$p=.933$	$p=.000^{**}$	
18.5 - 24.9 Healthy weight	20	40.	35	70.	18	36.	18	36			
25 - 29.9 Over weight	20	0	10	0	20	0	21	42			
30- 34.9 Obese	5	40.	3	20.	7	40.	6	12			
>35 Extremely obese	5	0	2	0	5	0	5	10			
		10.		6.0		14.					
		0		4.0		0					
		10.				10.					
		0				0					
				$X^2= 10.11, P= .009^{**}$							
						$X^2= .084, P= 4.657$					
Random blood sugar "mg/dL"									$X^2=1.007$	$X^2=18.07$	
Normal	8	16.	37	74.	5	10.	7	14.0	$p=.285$	$p=.000^{**}$	
Above normal	39	0	10	0	43	0	41	82.0			
Below normal	3	78.	3	20.	2	86.	2	4.0			
		0		0		0					
		6.0		6.0		4.0					
				$X^2= 13.23, P= .000^{**}$		$X^2= 0.493, P= 0.622$					

X^2 : Chi-square No statistically significant at $p > 0.05$. ****highly significant at $p < 0.01$.**

P_1 : p value for comparing between two group at **pre intervention**.

P_2 : p value for comparing between two group at **post intervention**.

Table (4): Patients' Diagnostic Criteria for MetS In The Study and Control groups (n=100).

Diagnostic Criteria for MetS	Study group (n=50)				Control group (n=50)				P_1	P_2	
	Pre		Post		Pre		Post				
	No.	%	No.	%	No.	%	No.	%			
Waist Circumference											
≥94 cm for men										$X^2=1.109$	$X^2=15.91$
Yes	15	30.0	3	6.0	20	40.0	20	40.0	$p=.217$	$p=.000^{**}$	
No	0	0.0	12	24.0	2	4.0	2	4.0			
≥80 cm for women										$X^2=2.320$	$X^2=13.41$
Yes	35	70.0	5	10.0	26	52.0	26	52.0	$p=.101$	$p=.000^{**}$	
No	0	0.0	30	60.0	2	4.0	2	4.0			
				$X^2= 10.97, P= .005^{**}$		$X^2= ., P= 0$					
Blood pressure level											
SBP ≥130 mmHg										$X^2=0.623$	$X^2=20.07$
Yes	45	90.0	7	14.0	47	94.0	44	88.0	$p=.497$	$p=.000^{**}$	
No	5	10.0	43	86.0	3	6.0	6	12.0			
DBP ≥85 mmHg										$X^2=0.650$	$X^2=20.36$
Yes	45	90.0	7	14.0	47	94.0	46	92.0	$p=.491$	$p=.000^{**}$	
No	5	10.0	43	86.0	3	6.0	4	8.0			
				$X^2= 16.41, P= .000^{**}$		$X^2= .755, P= 0.422$					
FBG level											
≥100 mg/dL										$X^2=0.500$	$X^2=21.88$
Yes	39	78.	10	20.	41	82.	37	74.0	$p=.476$	$p=.000^{**}$	
No	11	0	40	0	9	0	13	26.0			
		22.		80.		18.					
		0		0		0					
				$X^2= 15.90, P= .000^{**}$		$X^2= .956, P= 0.304$					
HDL cholesterol											
<40 mg/dL in men										$X^2=1.825$	$X^2=16.95$
Yes	12	80.0	2	13.3	18	81.8	16	72.7	$p=.175$	$p=.000^{**}$	
No	3	20.0	13	86.7	4	18.2	6	27.3			
<50 mg/dL in women											

Yes	33	94.3	5	14.3	25	89.3	24	85.7		
No	2	5.7	30	85.7	3	10.7	4	14.3	X²=1.534	X²=16.01
X²= 14.52, P= .000**				X²= .385, P= 0.741				p= .193	p=.000**	
Elevated triglyceride ≥150 mg/dL										
Yes	36	72.	5	10.	33	66.	33	66.0	X²=0.714	X²=18.97
No	14	0	45	0	17	0	17	34.0	p= .395	p=.000**
		28.		90.		34.				
		0		0		0				
X² = 17.10, P= .000**				X² = ., P= 0						

X²: Chi-square No statistically significant at p > 0.05. ****highly significant at p < 0.01.**
P₁: p value for comparing between two group at **pre intervention.**
P₂: p value for comparing between two group at **post intervention.**

Table (5): Frequency and Percentage Distribution of Total Patients' Knowledge Regarding Metabolic Syndrome Throughout Study Phases in Both Groups (n=100).

Variables	Study group (n=50)				Control group (n=50)				p ₁	p ₂	p ₃	p ₄
	Pre		Post		Pre		Post					
	No.	%	No.	%	No.	%	No.	%				
Satisfactory	5	10.0	44	88.0	4	8.0	6	12.0	X²=19.63	X²=1.321	X²=0.521	X²=16.08
									p=.000**	p=0.214	p=0.763	p=.000**
Unsatisfactory	45	90.0	6	12.0	46	92.0	44	88.0				
x̄ S. D	3.47 ± 1.11		19.80 ± 3.53		3.11 ± 1.33		3.98 ± 1.02					
	t= 23.90				t= 0.963							
	p= .000**				p= .352							

t= t. test. X²: Chi-square. No statistically significant at p > 0.05. **highly significant at p < 0.01.
P₁: p value for comparing between study group at **pre and post intervention.**
P₂: p value for comparing between control group at **pre and post intervention.**
P₃: p value for comparing between two group at **pre intervention.**
P₄: p value for comparing between two group at **post intervention.**

Table (6): Mean and Standard Deviation Score Regarding Self-rated abilities for health practices (Health self-efficacy measure) Throughout Study Phases in both Groups (n=100).

Variables	Study group (n=50)				Control group (n=50)				T	p-value	
	Pre		Post		Pre		Post				
	\bar{x}	S. D	%	\bar{x}	S. D	%	\bar{x}	S. D			%
Exercise	5.73 ± 2.56		20.5	21.66 ± 4.69	77.4	5.73 ± 2.56	20.5	5.73 ± 2.56	20.5	14.52	.000**
Psychological Well Being	6.04 ± 1.74		21.6	23.36 ± 3.41	83.4	6.04 ± 1.74	21.6	6.04 ± 1.74	21.6	16.23	.000**
Nutrition	6.79 ± 1.67		24.3	23.89 ± 3.15	85.3	6.79 ± 1.67	24.3	6.79 ± 1.67	24.3	18.00	.000**
Health Practices	5.93 ± 2.05		21.2	23.41 ± 3.07	83.6	5.93 ± 2.05	21.2	5.93 ± 2.05	21.2	17.37	.000**
Total	24.49 ± 5.21		21.9	92.32 ± 13.7	82.4	24.49 ± 5.21	21.9	24.49 ± 5.21	21.9	27.11	.000**

t= t. test. **highly significant at p < 0.01.

Table (7): Mean and Frequency Distribution of the Studied Patients Regarding Self-rated abilities for health practices (Health self-efficacy measure) Throughout Study Phases in both Groups (n=100).

Variables	Study group (n=50)				Control group (n=50)				X2	P1	P2
	Pre		Post		Pre		Post				
	No.	%	No.	%	No.	%	No.	%			
High self-efficacy ≥ 74.6	0	0.0	40	80.0	0	0.0	0	0.0	31.62	.000**	0.99
Moderate self-efficacy 37.5-74.6	4	8.0	8	16.0	3	6.0	4	8.0			
Low self-efficacy ≤ 37.3	46	92.0	2	4.0	47	94.0	46	92.0			
Total	24.49 ± 5.21		92.32 ± 13.7		26.5±7.4		26.8±6.8				
	t=27.11 p=.000**				f p=0.99						

t= t. test. X²: Chi-square. f= Fisher exact test (p1= pre , post for study group) , (p2 pre , post for control group **highly significant at p < 0.01.

Table (8): Mean of the Health-Promoting Lifestyle behavior Throughout Study Phases in both Groups (n=100).

Variables	Study group (n=50)				Control group (n=50)				t	p-value
	Pre		Post		Pre		Post			
	\bar{x}	S. D	\bar{x}	S. D	\bar{x}	S. D	\bar{x}	S. D		
Health Responsibility	13.53 ± 2.31	37.5	27.31 ± 5.50	75.9	13.53 ± 2.31	37.5	13.53 ± 2.31	37.5	21.96	.000**
Physical Activity	10.11 ± 1.81	31.6	22.40 ± 3.03	70.0	10.11 ± 1.81	31.6	10.11 ± 1.81	31.6	20.07	.000**
Nutrition	14.41 ± 2.25	40	29.25 ± 4.76	81.3	14.41 ± 2.25	40	14.41 ± 2.25	40	23.30	.000**
Spiritual Growth	18.90 ± 4.55	52.5	31.53 ± 2.93	87.5	18.90 ± 4.55	52.5	18.90 ± 4.55	52.5	14.63	.001**
Interpersonal Relations	18.22 ± 4.20	50.6	30.66 ± 3.07	85.2	18.22 ± 4.20	50.6	18.22 ± 4.20	50.6	14.24	.001**
Stress Management	11.27 ± 2.01	35.2	26.38 ± 4.17	82.4	11.27 ± 2.01	35.2	11.27 ± 2.01	35.2	19.75	.000**
Total	86.44 ± 12.9	41.6	167.53 ± 18.1	80.5	86.44 ± 12.9	41.6	86.44 ± 12.9	41.6	31.9	.000**

t= t. test. **highly significant at p < 0.01.

Table (9): Correlation between Knowledge, Self-efficacy and Health promoting Lifestyle at Pre and Post Intervention among The Study Group.

Variables		Total knowledge		Total self-efficacy	
		Pre	Post	Pre	Post
Total knowledge	r				
	p				
Total self-efficacy	r	.512	.593		
	p	.000**	.000**		
Total health promoting lifestyle	r	.521	.574	.543	.611
	p	.000**	.000**	.000**	.000**

r= correlation coefficient test. p= p-value. **highly significant at p < 0.01.

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