Effect of Counseling Program Based on Health Belief Model on Preventing Osteoporosis among Depo-Provera User's Women

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Abstract

Osteoporosis is diminished mass of bone degeneration of the micro architecture of it, which leads to a high risk of fractures particularly for women using hormonal contraceptives like Depo-Provera Study Aim: To evaluate the effect of counseling program based on health belief model on preventing osteoporosis among Depo-Provera user's women. Design: A quasi-experimental research design was utilized. Subject: A purposive sample of 102 women was divided randomly into study and control group each one 51 women. Tools: Three tools were utilized to assess sociodemographic characteristics, women knowledge about Osteoporosis, osteoporosis health belief and self-efficacy Results: it reveals that 45.1% and 43.1% of women used depo-provera in the age group between (20 -< 30) years in the studied and control group respectively, Furthermore 60.7% of studied group had poor knowledge regarding osteoporosis in pretest which decreased to 5.9 % and 7.9%, in addition their unhealthy belief was 66.7% in pretest which decreased to 7.8% and 11.8%, also 80.4% of them had a low self-efficacy in pretest which decreased to 7.8% and 9.8 % in immediate and posttest respectively also It revealed a positive relationship among women knowledge, health belief and self-efficacy it among study group with statistically significant variations. Conclusion: counseling program application was effective in increasing Knowledge and preventive behavior of the depo-provera user's women regarding osteoporosis. Recommendations: Designing and applying continuous counseling programs for raising preventive behavior and awareness of depo-provera user's women to prevent osteoporosis. Key words: Counseling Program, Depo-Provera, Health Belief Model, Osteoporosis

Introduction

Osteoporosis (OP) is a serious public health disease and one of the diseases that most threatens a woman's quality of life, according to the World Health Organization (WHO), "defines osteoporosis as an illness in which the bone matrix degenerates and bone mass decreases, increasing the risk of fragility and fracture. OP is known as a "silent disease" since the loss of bone mass may not be noticeable. It usually affects the wrist, hip, and spine. It isn't discovered until a fracture happens. (Elmorsy, et al, 2024).

Since progestins are a common hormone included in many kinds of contraception, they are among the more recent classes of drugs linked to osteoporosis. Medroxyprogesterone acetate (MPA) is the most often utilized progestin preparation in relation to bone loss. It's an injectable birth control called Depo-Provera. The risk of bone injury rises after two years of regular MPA use (Taqui, et al, 2021).

The contraceptive dose of Depo-Provera is maintained for at least 14 weeks, it is a very safe method of birth control that is injected every three months. Depo-Provera works by suppressing ovulation and thickening cervical mucus, primarily through the action of synthetic progesterone. Because MPA depends on higher progestin peaks, it suppresses estrogen levels, which are essential to preserving bone density. Because low estrogen levels increase bone resorption and decrease bone formation, they can lead to bone loss (**Zürcher**, **2024**).

Depo-Provera (medroxyprogesterone acetate or DMPA) is a widely used injectable contraceptive that provides effective, long-acting birth control. However, its association with bone mineral density (BMD) loss and osteoporosis has been a topic of concern and research. The bone mineral density (BMD) of women who use DMPA-IM is lower than that of nonusers; Young women experience the most BMD loss over the early few years of usage. In addition intramuscular medroxyprogesterone acetate (DMPA-IM) causes a hypoestrogenic condition that speeds up bone turnover, resulting in bone loss and a higher risk of fracture (Matovu, et al, 2022).

Furthermore several direct and indirect ways that estrogen affects BMD, some of which remains are mainly responsible unknown. They for controlling bone metabolism and Bone resorption is increased when it is lacking. Other factors play a key role in bone formation, such as Diet, exercise, hormonal status, calcium intake, genetic factors, and several external elements contribute to BMD loss. such as smoking, excessive coffee consumption, inadequate calcium intake, an unhealthy way of life and low serum vitamin D are some of the most important factors(Ampatzis, et al, 2022).

Despite the potentially fatal consequences of fractures and the effectiveness of anti-fracture therapies, osteoporosis is still a condition that is under diagnosed and undertreated. Hip fractures strongly elevate the chance of dying within a year after the fracture and are a strong predictor of future fractures. It's essential to identify who had a greater chance of developing osteoporosis and to put preventative measures in action. It is often known that prompt diagnosis and treatment offer several advantages. Treatment prevents damage, disability, and excess mortality by lowering the incidence of fractures (LeBoff, et al, 2022).

Current clinical guidelines advise lifestyle changes and ongoing bone mass monitoring to prevent osteoporosis and falls in Depo-Provera User's Women. According to the National Osteoporosis Foundation's guidelines, women should try to control their weight, exercise frequently, eat a healthy diet and obtain adequate calcium and vitamin D, decrease alcohol consumption, and stop smoking in order to prevent osteoporosis (Wang, et al, 2024).

The Health Belief Model (HBM) is an effective way to recognize health habits and causes of failure to comply with osteoprotective behaviors. The HBM is composed of six structures. The original HBM tenets were the first four structures. The final two were introduced as HBM research progressed. The following are the first of 6 components is perceived susceptibility, then Perceived seriousness, perceived benefits, perceived

barriers, health motivation and self-efficacy (Badawy, et al, 2024).

One effective strategy to protect the bone health among Depo-Provera user's women in the future is by increasing their awareness regarding osteoporosis prevention. The nurse should provide the women dietary advices about consuming more calcium and vitamin D. recognizing diets that are rich in calcium, and avoiding sodas and colas, which are generally high in phosphorus for improving Depo-Provera user's women understanding of osteoporosis. While educating the patient, the nurse should assess any potential barriers, such as limited local access to healthy foods and poor income. Nurses are also responsible for teaching patients the importance of regular tests, such as bone density testing, and healthy lifestyle choices, such as quitting smoking and consuming alcohol (Porter, et al, 2022).

<u>Significance</u>

About 3.9% of females between the ages of 15 and 49 used injectables. Around the world, 74 million people were using short-acting contraception. Sub-Saharan Africa and southeastern Asia are the primary markets for injectable containing depot medroxyprogesterone acetate (DMPA) (Zürcher, 2024). New contraception is now used by 48% of people worldwide. Particularly in low-income nations, injectable contraception is a widely used method of birth control (Su, L,et al,2024) Globally, between 1994 and 2019, the number of people using injectable contraceptives increased from 17 million to 74 million.(Upson, et al, 2020)

Women who use DMPA for the first time experience a decrease in a number of bone mass density measurements; possible negative effects on women's bone mass formation only appear after DMPA use for more than a year (Harahap, et al, **2022).** According to longitudinal studies, bone loss at the hip and spine occurs between 0.5% and 3.5%after one year of DMPA-IM use and between 5.7% and 7.5% after two years. According to another recent longitudinal study with a 4-year follow-up period the first 24 months of use were responsible for over 75% of the BMD loss at the hip and 90% at the spine (Matovu, et al, 2021). Women under 30 who had been exposed to DMPA for more than three years were shown to be three times more probable to suffer a fracture incidence (Stokes, et al, 2025). So it's important to perform counseling program for Depo-Provera user's women about

healthy and preventive behavior to prevent osteoporosis.

Study Aim:

The study was aimed to evaluate the effect of counseling program based on health belief model on preventing osteoporosis among Depo-Provera user's women.

Specific objective:

- Assessing women knowledge and health belief regarding osteoporosis prevention.
- Designing and implementing osteoporosis prevention based on health belief model.
- Evaluate the outcomes of application of health belief model.

Research hypothesis:

Knowledge and preventive behavior of the study women regarding osteoporosis will be improved after implementing the counseling program based on health belief model.

Subject and methods:

Study design:

Quasi experimental research design was used in the current study.

Setting:

The study was carried out at Western primary health care center at Minia city that located beside Chest disease hospital, in front of Saad Zaghloul Primary School at family planning clinic.

Sample type:

Purposive sample was used in this study.

Sample size:

The following formula was utilized to determine the sample size.

N= P×30/100 (Adams & McGuire, 2022)

N= sample size

P = total number during year 2022

 $N = \frac{340 \times 30}{100} = 102$

Sample size =102 women

The study women were divided randomly into two equal sections, each of two groups is 51 women:

- Group A (the study group)
- Group B (the control group)

Inclusion criteria:

• Depo Provera user's women < 1 years.

Exclusion criteria:

• Women diagnosed of osteopenia or osteoporosis.

- Women who are refuse to participate.
- Women have chronic diseases.
- Physical, cognitive disabilities.
- Rheumatoid.

Data collecting tools

The researcher developed it following a comprehensive review of the literature and comparable research projects carried out in other locations. Three tools were included.

Tool I: structure interviewing questionnaire which included two parts Part (1):

It was applied to evaluate demographic characteristics; like age, educational level occupation, residence, in addition to another data like period of taking Depo-Provera, number of children, body mass index ,family history of osteoporosisand source of women knowledge.

.Part (2): Questionnaire for Osteoporosis Knowledge Assessment:

The researcher designed it to evaluate the women's knowledge regarding osteoporosis .It consist of (9) multiple-choice questions which include definition, sign and symptoms of osteoporosis, the best time to strengthen the bones, risk factors of osteoporosis, osteoporosis preventive measures as physical activity and diet, treatment of osteoporosis and complication of osteoporosis.

Scoring system

Responses pertaining to the women's knowledge were scored and calculated. Each fully accurate response received two points; an incomplete but correct response received one, and an inaccurate or unknown response received zero. A total of zero to eighteen points was awarded. The sum of the correct answer scores was used to determine the overall knowledge scores. Total score that was less than (50%) (9 points) it indicates poor knowledge, total score that was from (50%- <75%) (9 to 13 points) it indicates fair knowledge and more than (75%) (13 points) indicated good knowledge (Mohammed, et al, 2018).

Tool II:- Osteoporosis Health Belief Scale (OHBS):-

It was designed to evaluate health beliefs related to osteoporosis. The adaptation of the OHBS to Turkish, and its validity and reliability were performed by (Kim, et al, 2013). It is a Likert scale consists of forty two items that assess individuals' health beliefs toward osteoporosis. The OHBS assesses seven constructs: "susceptibility, seriousness, calcium benefits, calcium barriers, exercise benefits, exercise barriers, and health motivation". Each item in the OHBS was scored from 1 (strongly disagree) to 5 (strongly agree). Each category consists of six questions, and the summary scores were computed by adding the scores of each category, resulting in a possible score range of 6 to 30. The OHBS consists of 42 items: 1-6: "susceptibility"; 7-12: "seriousness"; 13-18: "exercise benefits"; 19-24: "benefits of calcium intake"; 25-30: "barriers to exercise"; 31-36: "barriers to calcium intake"; and 37-42: "health motivation".

Scoring system

Each subscale item had a response range of 1 degree for strongly disagreeing and 5 degree for strongly agreeing. Each subscale has a range of 6 to 30. The range of the total score was 42-210. Higher scores on most of the subscales indicate very healthy beliefs. However, greater ratings on the two barriers subscales were associated with more negative health beliefs. Good Belief > 60 (>126) and Unhealthy Beliefs <60 % (≤ 126) (Kim,et al, 2013).

Tool III Osteoporosis Self-efficacy Scale:-

It is the opinion and the attitude to engage and maintain activity in face of obstacles. It was designed to evaluate participants' confidence in changing their behavior in relation to exercise (6 items) and calcium consumption (6 items). The scale displays the self-efficacy perception of weight-bearing exercise and calcium intake in preventing osteoporosis. It had 12 questions and 2 subscales measuring the perception of osteoporosis exercise and calcium self-efficacy (Janiszewska,et al,2016)

Scoring system

Responses range from 1 point for strongly disagreeing to 5 points for strongly agreeing. with a range of 6 to 30. The highest results for the overall

osteoporosis self-efficacy were 60, indicating that the individual had a good level of self-efficacy. The range of low self-efficacy was 12–36 points (\leq 60%), whereas the range of high self-efficacy was 37–60 points (> 60%).

Validity and Reliability of tools Validity:

The accuracy of the content of the tool was assessed by a team of five experts in the field of maternity and newborn health nursing. They made any necessary changes after reviewing it for comprehension, application, comprehensiveness, clarity, and ease of use.

Reliability:

In order to assess the internal consistency of the instruments' stability, reliability was statistically determined using the Alpha Cronbach test. (0.919) was the score on the osteoporosis knowledge test. Furthermore, the scores for the Osteoporosis Health Belief Scale and Osteoporosis Self-efficacy Scale were (.886) and (0.983), respectively. As a result, the sheets were deemed extremely trustworthy.

Ethical Considerations

The ethical committee at the Minia University Faculty of Nursing, along with the dean of the Faculty, granted written consent. for the study. The manager of the primary health care centers also granted permission for the research to be conducted. Prior to both the pilot and main studies, verbal consent was obtained from the women after clearly outlining the objectives of the study. The researcher informed participants that they had a choice to reject involvement or leave the study for any cause at any moment. It was emphasized to the participants that their involvement in the study was entirely voluntary. They provided assurances that all of their data would be kept private. and that their anonymity would be protected. All sheets were assigned codes, ensuring that the participants' names were not visible for the sake of anonymity. The research aligns with cultural, traditional, and religious concerns.

Pilot study

A pilot study was conducted prior to the start of the study. Ten women (10%) of whole participants, participated in this pilot phase. The purpose of the pilot study was to evaluate the clarity and completeness of the research tools, as well as to

gauge the time needed for the study. Adjustments were made in response to the pilot study's results. where necessary. Since no further adjustments were required, the women from the pilot study were incorporated into the total sample.

Study Procedure:

The researcher visited the medical center from 9 a.m. to 12 p.m., two days a week. Three phases were utilized to conduct the current study: pretest assessment, implementation, and evaluation and follow-up (Posttest).

<u>1-Assessment phase: (pretest)</u>

(1) Initially, the researcher held an initial meeting with the women to briefly outline the study's objectives and intentions. The women were made known that participation was entirely optional and that they might leave at any point. All participants gave their verbal consent.

(2) Once official approval was secured and the women provided their oral consent to involvement in the study, the researcher presented an summary and demonstration of the evaluation instruments. The researcher conducted individual interviews with each woman from both the study and control groups to gather data, sociodemographic including information. knowledge assessments, health beliefs related to osteoporosis, and self-efficacy in osteoporosis prevention, which served as baseline data. This process took approximately 25–30 minutes.

<u>2- Implementation for study group (carrying out education intervention)</u>

(1) During implementation phase, the study group's participants were provided information about osteoporosis and how to prevent it regarding (definition of osteoporosis, risk factors, complications, treatment, prevention, and effect of Depo Provera on bones). One session for each small group (2-5) women was taken about 45-60 min.

(2) In each session the researcher used a lecture method and audiovisual aids and allows women to asking discussions to achieve the

proposed goal to improve women knowledge about early detection and osteoporosis prevention measures. At the end of the lecture, feedback and immediate posttest (second evaluation)was acquired from the women to make sure that the greatest advantages were received.

(3) All the women in the study group received hand out (booklet) about osteoporosis. It was consisted of significant information about osteoporosis (concept, risk factors, complication, treatment, and prevention). Moreover, the researcher was contact women through phone or what's App for refreshing the provided knowledge and answering any questions. The study was conducted between October 2023 and March 2024.

Follow-up and evaluation (posttest)

Third evaluation was conducted after 3 months of counseling program implementation by meeting the women at family planning clinic (follow-up posttest) to ensure the effectiveness of counseling program. The same assessment tools were used (tool I (part two), tool II and tool III).

Statistical design

Descriptive statistics were used to collect. tabulate, and show the data in either number and/or percentage for qualitative data or using means and standard deviations to evaluate dispersion for quantitative data. A statistical package for the social science (SPSS), IBM (22) was utilized to analyze the data statistically as well as excel was used for figures draw. For qualitative data, the Chi square test (or Fisher test if there were less than five cases) was used to compare independent groups. P-values 0.05 were accepted as the degree of significance, while P values of < 0.01 were indicated highly significant. Using independent T test to compare the means between the study and control group whereas ANOVA was utilized to contrast the mean values of the pre, immediate and post 3 months test in the study group. Also Correlation coefficient was used to present a numerical overview of the degree and direction of the linear link between self-efficacy, health belief, and osteoporosis knowledge.

Results:-

Table	(1)	Distribution	of	the	studied	and	control	group	according	to	their	sociodemographic
charac	teris	stics: $(N = 102)$)						_			

	Studie	d group	Contro	ol group		D 1
Sociodemographic Characteristics	(N=51)	(N=51)	X	P. value
	No	%	No	%		
Age						
20- <30	23	45.1	22	43.1		
30 < 40	19	37.3	14	27.5	5 607	06 NS
> 40	9	17.6	15	29.4	5.007	.00
Mean ± SD	32.80 =	± 6.321				
Level of Education						
Illiterate	11	21.6	11	21.6		
Secondary school	27	52.9	29	56.8	220	000 NS
University	13	25.5	11	21.6	.230	.000
Occupation		-	-			
Employed	19	37.3	15	29.4	1 2 2 5	170 NS
Housewife	32	62.7	36	70.6	1.323	.1/9***
Residence						
Urban	11	25.5	8	15.7	1 400	164 NS
Rural	40	74.5	43	84.3	1.499	.104

Test used: chi square test. ^{NS} No statistically significant relation at P value more than 0.05.

Table 1 shows there is no statistically significance difference between the studied and control group in all items related to sociodemographic characteristics at (p. value >.05). Regarding age 45.1% and 43.1 % of the studied and control group their age were between 20-< 30 years with Mean and SD 32.80 ± 6.321 and 33.71 ± 6.503 years respectively. Concerning level of education 52.9% and 56.8% of the studied and control group their level of education secondary school respectively.



#More than one answer

FIGURE 1; distribution of the study sample regarding their source of information about osteoporosis (N=102)

FIGURE 1 shows that 80.4% and 84.3% of studied and control group their source of information about osteoporosis was from the family.



FIGURE 2; period of taking depo-provera among the studied and control group (N= 102)

FIGURE 2 represents the period of taking depo-provera among the studied and control group, it shows that 51% and 43.1% of the studied and control group their period of taking depo-provera was more than 6 months and less than 12 months with(p. value >.05).



FIGURE 3; family history of osteoporosis among the studied and control group (N=102)

FIGURE 3; illustrates family history of osteoporosis among the studied and control group. It reveals that 58.8%, 74.5% of the studied and control group didn't have a family history of osteoporosis respectively comparing the two groups, there was no statistically significant difference at (p. value >.05).

Table (2): Distribution of the studied group regarding their total knowledge about Osteoporosis in Pre, immediate and post 3 months test (N=51)

Total scores	Pretest		Immediate		Post 3	months test	F	P Value
	Ν	%	Ν	%	Ν	%	Ľ	1 .value
Poor	31	60.7	3	5.9	4	7.9		0.001**
Fair	19	37.3	19	37.3	30	58.8		
Good	1	2.0	29	56.8	17	33.3	80.483	
Mean ± SD	7.53 ± 2.8		13.88±2.8		12.24±	2.1		

"Test used: ANOVA test." "**Highly statistically significant difference at Pvalue<.01"

Table 2: it shows that 60.7% of the studied group had poor knowledge about osteoporosis; in the immediate and post-three-month tests, this percentage decreased to 5.9% and 7.9%, respectively. In the pretest, their mean knowledge score was 7.53 ± 2.8 ; in the immediate and post-three-month tests, it increased to 13.88 ± 2.8 and 12.24 ± 2.1 , respectively, showing highly statistically significant improvements in knowledge levels (p. value <0.01).

Table (3): Distribution of the studied group regarding their Health Belief about Osteoporosis in Pre, immediate and post 3 months test (N=51)

Total scores	Pretest		Immediate		Post 3 m	nonths test	F	P Valua
	Ν	%	Ν	%	Ν	%	Ľ	1 .value
Unhealthy Belief	34	66.7	4	7.8	6	11.8		.001**
Healthy Belief	17	33.3	47	92.2	45	88.2	53.850	
Mean ± SD	120.470±	11.844	160.372=	±6.38 7	153.607=	±7.738		

"Test used: ANOVA test."

"**Highly statistically significant difference at P-

value≤.01"

Table 3: illustrates that the unhealthy belief was 66.7% in pretest which decreased to 7.8% in immediate test and 11.8% in post 3 months test. A highly statistically significant difference was observed in the total Osteoporosis Health Belief when comparing pre, immediate, and post 3 months test results, with a p-value of 0.001.

Table (4): Distribution of the studied group regarding their self efficacy about Osteoporosis in Pre, immediate and post 3 months test (N=51)

Total scores	Pretest		Immediate		Post 3 m	onths test	F	P Value	
	Ν	%	Ν	%	Ν	%	1	1 .value	
Low Self-efficacy	41	80.4	4	7.8	5	9.8			
High Self-efficacy	10	19.6	47	92.2	46	90.2	79.203	.001**	
Mean ± SD	26.039 ± 5.509		53.352±6.00		50.411±4	4.669			

"**Highly statistically significant difference at P-"Test used: ANOVA test" value<.01"

Table 4: illustrates that 80.4% of the studied group had a low self-efficacy in pretest which decreased to 7.8% in immediate test and 9.8% in post 3 months test. There was highly statistically significant difference between pre, Immediate and Post 3 months test at (p = 0.001).

Table	(5):	Relation	between	total	knowledge	of	the	studied	group	with	their	socio-demographic
charac	teris	tics $(n = 5)$	1).									

	Total knowledge										
		Pretest			Immedia	te	Post	t 3 Month	s test		
Socio-demographic characteristics	Poor	Fair	Good	Poor	Fair	Good	Poor	Fair	Good		
	(N=31)	(N=19)	(N=1)	(N=3)	(N=19)	(N=29)	(N=4)	(N=30)	(N=17)		
	%	%	%	%	%	%	%	%	%		
Age/year											
20-<30 (N=23)	32.3	63.2	100.0	33.4	52.6	41.4	50.0	50.0	35.3		
30 < 40 (N=19)	41.9	31.5	0.0	33.3	31.6	41.4	25.0	33.3	47.1		
> 40 (N=9)	25.8	5.3	0.0	33.3	15.8	17.2	25.0	16.7	17.6		
X^2 (<i>P</i> – value)	6.892 (.142) ^{NS}			1.187 (880) ^{NS}		1.406 (1.406 (843) ^{NS}			
Level of Education											
Illiterate (N=11)	32.3	5.3	0.0	0.0	15.8	27.6	25.0	26.7	11.8		
Secondary school (N=27)	48.3	57.9	100.0	66.7	78.9	34.5	75.0	73.3	11.8		
University (N=13)	19.4	36.8	0.0	33.3	5.3	37.9	0.0	0.0	76.4		
X^2 (<i>P</i> – value)	6.501 (.1	l65) ^{NS}		10.711	(03*)		35.309	(.001)**			
Occupation											
Employed (N=19)	32.3	42.1	100.0	33.3	42.1	34.5	25.0	36.7	41.2		
Housewife (N=32)	67.7	57.9	0.0	66.7	57.9	65.5	75.0	63.3	58.8		
$X^2 (P - \text{value})$	$1e) 2.207 (.332)^{NS} .306 (.858)^{NS} .373 (830)^{NS}$										
Residence											

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	Total knowledge										
	Pretest				Immedia	te	Post 3 Months test				
Socio-demographic characteristics	Poor	Fair	Good	Poor	Fair	Good	Poor	Fair	Good		
	(N=31)	(N=19)	(N=1)	(N=3)	(N=19)	(N=29)	(N=4)	(N=30)	(N=17)		
	%	%	%	%	%	%	%	%	%		
Urban (N=11)	29.0	10.5	0.0	33.3	368	10.3	25.0	26.7	11.8		
Rural (N=40)	71.0	89.5	100.0	66.7	63.2	89.7	75.0	73.3	88.2		
$X^2 (P - \text{value})$	2.665 (.264) ^{NS}			5.025 (081) ^{NS}		1.455 (.483) ^{NS}				

"Test used: chi squire".

"* Statistically significant at P value less than or equal to

0.01."

"NS No statistically significant relation at P value more than 0.05"

"**Highly statistically significant difference at P- value < .01"

Table (5): shows how the sociodemographic characteristics of the studied group relate to their overall knowledge in the pre, immediate, and post three-month tests. The total knowledge scores of the study group in the immediate and post-three-month tests with respect to their educational status showed a statistically significant relationship (P value = 0.03, = 0.001), respectively.

Table (6): Relation between total Osteoporosis Health Belief of the studied group their sociodemographic characteristics (n = 51).

	Total Osteopor	rosis Health l	Belief			
Socio-demographic characteristics Age/year 20- $<30 (N=23)$ 30 < 40 (N=19) > 40 (N=9) $X^2 (P - value)$ Level of Education Illiterate (N=11) Secondary school (N=27) University (N=13) $X^2 (P - value)$ Occupation Employed (N=19) Housewife (N=32) $X^2 (P - value)$ Residence Urban (N=11)	Pretest		Immediate		Post 3 months	test
Socio-demographic characteristics	Unhealthy Belief (N=34)	Healthy Belief (N=17)	Unhealthy Belief (N=4)	Healthy Belief (N=47)	Unhealthy Belief (N=6)	Healthy Belief (N=45)
	%	%	%	%	%	%
Age/year						
20-<30 (N=23)	38.2	58.8	25.0	46.8	50.0	44.4
30 < 40 (N=19)	35.3	41.2	75.0	34.0	50.0	35.6
>40 (N=9)	26.5	0.0	0.0	19.2	0.0	20.0
X^2 (<i>P</i> – value)	5.670 (.06) ^{NS}	•	2.815 (.245) ^{NS}	5	1.533 (.465) ^{NS}	
Level of Education						
Illiterate (N=11)	29.4	5.9	75.0	17.0	66.6	15.6
Secondary school (N=27)	44.1	70.6	25.0	55.3	16.7	57.8
University (N=13)	26.5	23.5	0.0	27.7	16.7	26.6
X^2 (<i>P</i> – value)	4.448 (.108) ^{NS}		7.492 (.02)*		8.310 (.016)*	
Occupation						
Employed (N=19)	26.5	58.8	25.0	38.3	16.7	40.0
Housewife (N=32)	73.5	41.2	75.0	61.7	83.3	60.0
X^2 (<i>P</i> – value)	5.075 (.02)*		.279 (597) ^{NS}		1.233 (.267) ^{NS}	
Residence						
Urban (N=11)	17.6	31.3	0.0	25.5	0.0	20.0
Rural (N=40)	82.4	68.7	100.0	74.5	100.0	80.0
$X^2 (P - value)$	1.173 (.279) ^{NS}		1.336 (.248) ^{NS}	5	1.457 (.227) ^{NS}	

"Test used: Chi squire test"

"NS=Not statistically significance"

Table (6): demonstrates the relationship between total Osteoporosis Health Belief of the studied group in pre, immediate and post 3 months test with their socio-demographic characteristics. There was statistically significant relation between the studied group total score of Osteoporosis Health Belief in immediate and post 3 months test as regards level of education (P value = 0.02, =0.016) respectively.

[&]quot;*Statistically significant difference at P-value≤ .05"

Table (7): Relation between total Osteoporosis Self-efficacy of the studied group with their sociodemographic characteristics (N = 51).

			Total Osteopor	osis Self-efficacy	y	
	Pret	est	Imme	diate	Post 3 m	onths test
Socio-demographic characteristics	Low Self- efficacy (N=41)	High Self- efficacy (N=10)	Low Self- efficacy (N=4)	High Self- efficacy (N=47)	Low Self- efficacy (N=5)	High Self- efficacy (N=46)
	%	%	%	%	%	%
Age/year						
20-<30 (N=23)	51.2	20.0	50.0	44.7	60.0	43.5
30 < 40 (N=19)	31.7	60.0	25.0	38.3	20.0	39.1
> 40 (N=9)	17.1	20.0	25.0	17.0	20.0	17.4
X^2 (<i>P</i> – value)	3.504 (.173) ^{NS}		.331 (.847) ^{NS}		.733 (.693) ^{NS}	
Level of Education						
Illiterate (N=11)	24.4	10.0	100.0	14.9	0.0	23.9
Secondary school (N=27)	48.8	70.0	0.0	57.4	20.0	56.5
University (N=13)	26.8	20.0	0.0	27.7	80.0	19.6
X^2 (<i>P</i> – value)	1.603 (.449) ^{NS}		15.783 (.001)*	*	8.794 (.012)*	
Occupation						
Employed (N=19)	31.7	60.0	25.0	38.3	40.0	37.0
Housewife (N=32)	68.3	40.0	75.0	61.7	60.0	63.0
X^2 (<i>P</i> – value)	2.753 (.097) ^{NS}		.279 (.597) ^{NS}		.018(894) ^{NS}	
Residence						
Urban (N=11)	24.4	20.0	25.0	21.3	0.0	23.9
Rural (N=40)	75.6	80.0	75.0	78.7	100.0	76.1
X^2 (<i>P</i> – value)	.086 (.769) ^{NS}		.03 (862) ^{NS}		1.524 (217) ^{NS}	

"*Statistically significant difference at P-value≤ .05"

"NS=Not statistically significance"

"**Highly statistically significant difference at P- value < .01"

Table (7): shows that there was a statistically significant relation between the total scores of the studied group education and Osteoporosis Self-efficacy in immediately and post three months (P values = 0.001, = 0.012, respectively).

Table ((8):	Correlatio	n between	studied	group	Knowledge,	Health	Belief	and	Self-efficacy	regarding
Osteop	orosi	is in pre, in	nmediate a	and post	3 mont	hs test					

		Pretest			Immedia	te	Post 3 months test		
Variables	Osteoporosis Knowledge	Osteoporosis Health Belief	Osteoporosis Self-efficacy	Osteoporosis Knowledge	Osteoporosis Health Belief	Osteoporosis Self-efficacy	Osteoporosis Knowledge	Osteoporosis Health Belief	Osteoporosis Self-efficacy
Osteoporosis Knowledge	•			•	•			•	
r. value	1	.862	.641	1	.606	.606	1	.571	.591
P.value	-	0.001**	0.001**	-	0.001**	0.001**	-	0.001**	0.001**
Osteoporosis Health Belief									
r.value	.862	1	.698	.606	1	1.000	.571	1	.903
P.value	0.001**	-	0.001**	0.001**	-	0.001**	0.001**	-	.001**
Osteoporosis Self-efficacy	•			•	•	•		•	
r.value	.641	.698	1	.606	1.000	1	.591	.903	1
P.value	0.001**	0.001**	_	0.001**	0.001**	-	0.001**	.001**	-
	0.001	5 1 1 4		,	(1 0.01

"*Correlation is significant at the 0.05 level (2-tailed)". "** Correlation is significant at the 0.01 level (2-tailed)."

Table (8): shows that the studied group's knowledge of osteoporosis, health beliefs, and self-efficacy were positively correlated in the pre, immediate, and post-three-month tests. The differences were statistically significant, with a p-value of 001.

Discussion

Osteoporosis is a significant global health issue, defined by the decline of bone mass and the degeneration of the bone's micro architecture, It causes a high risk of fractures particularly for women using hormonal contraceptives like Depo-Provera, due to the hormonal changes it causes. Osteoporosis can be particularly devastating if not addressed early. So it is essential to understand how targeted interventions including counseling can help to reduce the risk of osteoporosis in Depo-Provera user's women (Camacho, 2021).

As regard to demographic characteristics among the studied sample nearly half of the study group and over two thirds of the control group were between the ages of 20 and 30 years old, according to the present study, with mean and SD ages of 32.80 ± 6.321 and 33.71 ± 6.503 years, respectively.

This may have rendered to that females within the age period of 20-30 years are more likely to be sexually active and seek contraception, as this is a common age for women to start or expand families while also trying to avoid unintended pregnancies. Depo-Provera, as a long-acting reversible contraceptive, is commonly chosen by women in this age group due to its convenience, effectiveness, and long-term protection. This age group is often more responsive to health education and counseling programs that focus on preventing future health issues, such as osteoporosis. This is often considered the optimal reproductive age. This result is in harmony with (Pinar et al., 2020) their study findings revealed that the Mean age and SD of the women in the study was 33.49 ± 9.8 .

In relation to the degree of education, the results showed that over half of the studied and control group their level of education was secondary school. This may be due to the vast majority of people in rural Upper Egypt has low educational level because of rural culture, environmental factors, and low socioeconomic status. The results of the study also supported a study by (Mahmoud et al., 2020), which demonstrated that over half of the study and control groups were in secondary school. The study's findings contradict those of (Nonye-Enyidah et al., 2020) who demonstrated that around two-thirds of the study group had postsecondary education.

Regarding occupation, the present study discovered that, compared to little over one-third of the participants in the control group, around twothirds of the study group were housewives. the outcomes of the present study supported those of the study by (Badawy et al., 2024), which showed that fewer than three quadrants of study females were housewives. The investigation was performed by (Mohamed *et al.*, 2024) demonstrated that almost two-thirds of the female participants were employed, which is in contradiction to the this study's results.

Regarding residency, this research indicates that over two-thirds of both the study and control groups were situated in a rural environment. The researcher believes this is likely due to the fact that most villages in Upper Egypt have limited healthcare services and restricted access to medical facilities in rural regions. This results supported with (Heba *et al.*, 2022), stated that half of their studied group came from rural areas. In contrast to the findings of this study (Cangdra *et al.*, 2020), stated that over two-thirds of their participants were from urban regions.

By looking to source of information about osteoporosis, the current study revealed that over two- thirds of the study and control group their information about osteoporosis was from the family. This may be due to health information is often shared within family networks. Family members especially older relatives, who may have personal experience or knowledge about bone health, play a significant role in educating younger generations on health-related topics. This can lead to family becoming a primary source of health information. especially when formal health education sources are less accessible. This outcomes was in contradiction with (Mohamed et al., 2024) whose study showed that internet and physicians were the most common source of knowledge about osteoporosis among study subjects.

As regards, period of taking depo-provera among the participants, these study outcomes demonstrated that over half and almost two quarter of the studied and control group their period of taking depo-provera was more than 6 months and less than 12 months. This may be explained with; many women initially try Depo-Provera for a period of 6 to 12 months to assess its suitability for their lifestyle and health needs. This duration allows them to evaluate the contraceptive's effectiveness and side effects, such as impacts on menstrual cycles or potential changes in bone density. The current study finding was compatible with the study performed by(**Abdolalipour** *et al.*, **2021**) observed that close to two thirds of the study participants use contraceptive injection (Depo-Provera) for less than one year. This result was also disagreed with (Matovu, 2021) they found that near two thirds of study participants use Depo-Provera for a long period more than one year.

Concerning the family history of osteoporosis in the studied and control groups, the findings demonstrated that over two-thirds of the studied group and over half of the control group reported no family history of the condition. This result aligns with (Wang et al., 2021) which demonstrated that nearly half of the participants in their study had no family history of osteoporosis. Converselv. this finding contradicts the observations made by (Askarian et al., 2019) who noted that over a quarter of the participants had a family history of osteoporosis.

As regards total knowledge, Health Belief Scale and Self-efficacy about Osteoporosis in Pre, immediate and post 3 months' test, this study outcomes shown that the improvement was highly statistically significant in the study group's knowledge, total Osteoporosis Health Belief, total Scores of Osteoporosis Self-efficacy between pre, Immediate and Post 3 months. This outcome is the same as the study done by (Pinar et al., 2020) indicated that after the intervention, study participants' knowledge and beliefs had increased. This result was also in the same line with the findings of (Chan, et al, 2019), who found that research participants' knowledge and attitudes about osteoporosis had significantly increased. The current study concurred with (Awad et al., 2022) who said after the intervention, study participants' knowledge and views had increased. It was also reported by (Abdolalipour et al., 2021) that the investigated group's posttest was significantly higher than pretest after the application of the education program. Furthermore this result was consistent with (Wang, et al., 2024) whose findings documented a positive improvement in osteoporosis knowledge, health beliefs, and selfefficacy post intervention. Additionally, this result aligns with the findings of (Rezaei et al., 2024), which indicated a notable enhancement in women's knowledge of osteoporosis, as well as their health beliefs and self-efficacy, immediately and at the posttest assessment.

By looking to this study results it demonstrated that there wasn't statistically significant association between the studied group's overall knowledge in the pre, immediate, and post three-month tests and their sociodemographic characteristics except level of education. These outcomes may be explained by the beneficial impact of the given teaching recommendations, which may have changed patients' health-related behaviors and thus enhanced their health. It also may be explained with that participants with higher education may have а stronger baseline understanding or greater capacity to retain new health information. Education often enhances critical thinking, comprehension, and access to health resources, making it easier for these individuals to integrate and apply osteoporosisrelated knowledge. The lack of a significant association with other demographic factors highlights that knowledge improvements were more closely tied to educational background than age, occupation, or marital status. Moreover this outcomes also was in the same line as (Etemadifar et al., 2019), indicated that an individual's level of education influences their understanding of osteoporosis aligns with studies showing that individuals with higher education levels often have better knowledge of osteoporosis and its prevention. For instance, research on Iranian women demonstrated that higher educational attainment significantly correlates with better understanding of osteoporosis risks and prevention practices, while lower education levels are associated with limited awareness. This highlights the importance of educational initiatives in improving osteoporosis knowledge, particularly for those with lower educational backgrounds.

In relation to the outcomes of this study demonstrated that there wasn't statistically significant correlation between the total Osteoporosis Health Belief score of the studied group and with the other socio-demographic characteristics in pre, immediate and post 3 months' test except level of education. It may be rendered to higher education levels may equip individuals with better critical thinking and comprehension skills, making them more receptive to health messages and more likely to internalize health beliefs related to osteoporosis. In contrast, other socio-demographic factors may not directly influence belief formation, as they are less related to cognitive processing skills exposure to information. prior health or Furthermore this results also was aligned with(Gammage et al., 2019) who found The significant influence of education level on osteoporosis health beliefs aligns with findings in education studies that show often shapes individuals' health perceptions, while other

Demographic factors (e.g., age, income, married status) generally do not display significant effects on health belief scores. Higher education levels are associated with improved understanding of health risks and prevention, supporting the development of proactive health beliefs. This has been shown in research where education levels significantly impacted health motivation and perceived susceptibility in osteoporosis prevention. More over this results also was in accordance with (Chan et al., 2018) who found that higher levels of education can increase individuals' awareness and positive health beliefs, leading to more proactive behaviors regarding osteoporosis prevention and management. In populations with lower educational attainment, there is often limited access to detailed health information, which can restrict knowledge and belief formation regarding prophylactic measures (e.g., consumption of calcium and exercise) necessary for bone health.

Concerning Correlation between studied group Knowledge, Health Belief and Self-efficacy related to Osteoporosis, the present study findings demonstrated a positive relationship between studied group knowledge around osteoporosis Knowledge, Health Belief and Self-efficacy in pre, immediate and post 3 months' test with statistically significant differences. It may be rendered to the positive correlation observed in this study aligns with established theories regarding healthy habits, such the Health Belief Model and theory of Social Cognitive. When individuals gain more knowledge about osteoporosis, they better understand both the risks associated with the condition and the importance of preventive measures. This awareness strengthens health beliefs, which in turn reinforces their motivation to adopt preventive behaviors. These outcomes may also be explained by the positive effects of the offered counseling program, which may have changed the patients' health-related habits and thereby enhanced their health .These results were identical with (Elgzar et al., 2023) who found that women with higher knowledge and strong health thoughts towards osteoporosis had better preventive behaviors and self-efficacy, reinforcing the role of health beliefs and knowledge in behavior change efforts. Moreover The finding agreed with (Mohammed et al., 2018) also found that self-efficacy and osteoporosis beliefs were significantly correlated, suggesting that health belief models can effectively increase individuals' confidence in preventive measures by framing osteoporosis as a serious and preventable condition.

By enhancing self-efficacy, individuals are certainly want to participate more consistently in preventive actions, like calcium consumption through food and exercise, which are critical to osteoporosis prevention. Furthermore This result matched with (Gammage et al., 2019) whose research findings support for a positive correlation between osteoporosis knowledge, health beliefs, and selfefficacy, particularly related to osteoporosis prevention practices. They found that elements of the Health Belief Model (HBM), including selfefficacy and health motivation, were significant predictors of osteoporosis prevention actions, such as calcium consumption through food and exercise. This aligns with the current study's findings which indicating that health counseling initiatives focusing on these areas can enhance belief-driven, selfefficacious behaviors for osteoporosis prevention.

CONCLUSION

Looking at the findings of this study concludes that:-

The application of counseling program based on health belief model was effective in increasing Knowledge and preventive behavior of the depo-provera user's women regarding osteoporosis. A positive relationship was found between the study group osteoporosis knowledge, health belief and self-efficacy with statistically significant differences.

Recommendation

In light of the study's conclusions, it was suggested that

- 1. Designing and applying continuous counseling programs for raising preventive behavior and awareness of Depo-Provera user's women about the value of vitamin D, calcium, and exercise to prevent osteoporosis.
- 2. Use Depo-Provera cautiously and consider alternative contraceptives if long-term use is anticipated.
- 3. Integrate counseling by health care providers into contraceptive care to support long term bone health.
- 4. Schedule regular check-ups to assess bone health and discuss any concerns related to Depo-Provera users.
- 5. Consider dual-energy X-ray absorptiometry scans (DEXA) for women susceptible to osteoporosis especially those used Depo-Provera for more than 2 years.

6. Perform frequent weight-bearing activities such as dancing, biking, running, and walking in addition to activities that strengthens muscles such resistance bands ,lifting weights, and body-weight activities.e.g., squats, push-ups exercises to promote bone density and strength for at least 30 minutes of exercise, 3-5 times per week.

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