

Effect of Percutaneous Coronary Intervention on Quality of Life among Coronary Artery Disease Patients in Erbil City

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ABSTRACT

Background and objective: Quality of life is acknowledged as a vital outcome of healthcare measures, mostly in persons with heart disease. The main purpose of percutaneous coronary intervention is improving patients' quality of life. This study aimed to evaluate the effect of percutaneous coronary intervention on the quality of life of coronary artery disease patients at Surgical Specialty Hospital-Cardiac Center in Erbil City.

Methods: A pre-post study design was conducted to evaluate the quality of life of 100 patients with coronary artery disease before undergoing percutaneous coronary intervention, and three months after the performed percutaneous coronary intervention, it was conducted from January 2022 until December 2022. The quality of life data was assessed through the Short Form-36 health status survey. It consists of 36 questions that measure eight health concepts divided into two dimensions: the physical and mental aspects. The highest score indicates better quality of life. Data were analyzed using the Statistical Package for the Social Sciences (Version 26).

Results: Most of the study participants were males with Mean and Standard Deviation of age 47.9 ± 6.8 . The highest percentage were married, able to read and write, self-employed, and hasn't previous percutaneous coronary intervention. The results showed that patients who underwent percutaneous coronary intervention significantly improved their quality of life after performing percutaneous coronary intervention in the following subdomains of physical component summary (physical functioning, role-physical, general health) and (social functioning), P -value < 0.05 . While in subdomains of mental component summary (bodily pain, vitality, role-emotional and mental health) there were no statistically significant differences P -value > 0.05 .

Conclusion: The study concluded that overall quality of life significantly improved after performing percutaneous coronary intervention for coronary artery disease patients, mostly in the physical aspect compared with the mental aspect.

Keywords: Percutaneous Coronary Intervention; Quality of Life; Coronary Artery Disease.

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INTRODUCTION

Cardiovascular diseases (CVDs) are the main causes of death worldwide. A predictable 17.9 million persons died from CVDs in 2019, representing 32% of overall deaths globally >75% of coronary artery disease deaths happen in low and -middle-income countries [1]. According to the latest WHO data published in 2020, Coronary Artery Disease (CAD) deaths in Iraq reached 36,594 (24.98%) of total deaths in 2021. The age-adjusted death rate is 227.26 per 100,000 of the population which ranking Iraq 23rd in the world [2]. The cardiac and metabolic indicators carry a predisposition to a chronic disease, such as heart disease, it can comprise a single factor or can be associated with metabolic syndrome. Early coronary intervention is crucial to prevent cardiovascular complications [3]. Percutaneous Coronary Intervention (PCI) is nowadays the well-known gold standard treatment; it should be conducted along with other therapeutic methods for secondary prevention. PCI offers numerous advantages together, which include fewer mortality rates, faster medical improvement, decreased disability, lower risk of new cardiac events, slower the development of CAD, and better quality of life [4]. In Iraq, although precise statistics are not available, nonetheless, with the prevalence increasing, the number of patients with coronary artery disease, and a great number of patients are daily undergoing PCI, in accordance with statistical facts from the Surgical Specialty Hospital-Cardiac Center in Erbil City. The number of PCI was 2526 in 2020 [2]. Patients with CVD experience numerous physical symptoms, including fatigue, dyspnea, or chest pain, which affect their physical, emotional, and social well-being with significant impairment in quality of life (QoL) [5]. During the past decades, PCI has been one of the fastest-growing therapeutic coronary

interventions for patients with narrowed/blocked coronary arteries and improves the quality of life [6]. Quality of life is recognized as a significant outcome measure of health care, particularly in patients with long-lasting diseases such as coronary artery disease [7]. Poor quality of life has been identified as an independent risk factor for mortality and major cardiac events in patients with cardiovascular disease [8]. For patients with CAD who underwent PCI, quality of life is an important outcome indicator, along with death and recurrence rates [9]. All things considered, this study aimed was to evaluate the impact of percutaneous coronary intervention on quality of life through the used of the SF-36 health survey in Erbil City in the Kurdistan region of Iraq.

METHODS

A pre-post design study was conducted at Surgical Specialty Hospital-Cardiac Center after taking ethical approval from the ethical committee (code no. 140) and Date Sep 2021, at College of Nursing/Hawler Medical University, Erbil, Kurdistan region of Iraq from Jan 2022 to Dec 2022, on 100 coronary artery diseases (CAD) patients before undergoing percutaneous coronary intervention, after 3 months who performed percutaneous coronary intervention were carefully chosen with the purposive sampling method according to the inclusion criteria of the study. The participants of this study were adult patients diagnosed with coronary artery disease, which needed percutaneous coronary intervention, which was confirmed by coronary angiography, and were conscious, while; the exclusion criteria were patients who had communication problems and coronary artery bypass graft. The questionnaire consisted of demographic data and clinical

data such as (age, gender, level of education, marital status, occupation, cigarette smoking, family history, previous history of PCI, duration of diagnosis of heart disease) and cardiac and metabolic indicators such as blood pressure, which was classified by the World Health Organization (WHO) as normal < 120/<80 mmHg; pre-hypertension: >120-139/85-89 mmHg; stage 1 hypertension 140-159/90-99 mmHg; stage 2 hypertension: >160/>100 mmHg[10]. Regarding biomedical lipid values classified based on the American Diabetes Association (ADA) as total cholesterol / (mg/dl) (High ≥ 200 , Low <200), triglycerides (mg/dl) (High ≥ 150 , low <150), low-density lipoprotein (LDL) (mg/dl) (high ≥ 100 , low <100), high-density lipoprotein (HDL) (mg/dl) High ≥ 45 , low <45) [11]. Glycated hemoglobin (HbA1c) is a medical term that refers to the typical levels of blood sugar in a person with type 2 diabetes mellitus, which is classified by the American Diabetes Association (ADA), Good glycemic control HbA1c ($\leq 7\%$) and poor glycemic control HbA1c ($> 7\%$) [12]. Body mass index (BMI): It was calculated as the weight (kg) divided by height squared (m^2). In addition, body mass index was categorized according to the World Health Organization (WHO) as underweight (< 18.5), (18.5-24.9) normal, and overweight (25-29.9). Obesity class I (30.0–34.9) class II (35.0–39.9) Extreme obesity class III (40.0) [13,14]. Mean waist circumference (WC) ranges between populations from 83-98 cm in men and from (78-91) cm in women. Mean hip circumference (HC) ranged from 94-105cm in men and from (97-108) cm in women, respectively, and the World Health Organization classifies the risk of being affected by weight-related health conditions according to the Waist-Hip Ratio (WHR). For women: low (≤ 0.80), medium (0.81-0.85), and high (> 0.86). While for men, low (≤ 0.95), medium

(0.96-1.0), and high (> 1.0) [13,14]. Regarding the echo study, left ventricular ejection fraction (LVEF) is classified by the American College of Cardiology (ACC) as hyper dynamic = LVEF (greater than 70%); normal LVEF 50% to 70% (midpoint 60%); mild dysfunction LVEF 40% to 49% (midpoint 45%); moderate dysfunction LVEF 30% to 39% (midpoint 35%); severe dysfunction = LVEF less than 30% [15]. The standardized quality of life (QoL) assessment tool was a validated and reliable short form-36 (SF-36) survey and is a common multidimensional tool containing eight domains, called physical functioning (PF), role-physical (RP); bodily pain (BP); general health (GH); role-emotional (RE); vitality (VT); social functioning (SF); and mental health (MH). The scores are gathered into two aspects: the Physical Component Summary (PCS) and the Mental Component Summary (MCS). The overall scores range from zero to 100 with higher scores representing better QoL. There is a different Likert scale used in the Quality of Life (SF-36) Health Survey. In regard to the transformation score, scores are converted to a 0-100 scale. The lowest score indicates functional limitation, severe social and role disability, and distress. High scores indicate the absence of limitations and disability [16,17]. Patients were informed and verbally consented to the participation of the study, also explaining the purpose of this study before starting the interview, and were told that their participation would be voluntary. Patients who evaluate the effect of PCI on QoL by changing the outcome variables of the study, in the post-test, CAD patients were taken again after three months of PCI. Statistical data were analyzed using (SPSS Version 26). Mean and standard deviation (SD) were accessible for measurable variables; frequencies and percentages were given for categorical data. A paired t-test

was used to compare subdomain and overall quality of life. The Kolmogorov-Smirnov test is used to evaluate the assumption of normality. P values less than 0.05 were considered significant.

RESULT

Table 1 shows the demographic and medical data of the study sample; the age of participants ranged from 33-60 years, and the mean age was 47.90 years (SD = 6.8); nearly half the percentage 47% was within the age group 47-53 years, and 66% of the sample was male. In regard to the level of education, less than half the percentage

42% were able to read and write, and a higher proportion 88% were married. Regarding occupation 38% of the self-employed, in relation to cigarette smoking 10% were current smoker, 70% of patients had smoked less than 1 pack/day for less than 10 years. More than half a percentage 55% of patients does not have a family history of heart disease. The finding of the study shows 89% of patients had not undergone PCI previously; also, 49% of patients had been diagnosed with coronary artery disease (CAD) between one and three years.

Table 1: Demographic and clinical data of the study participants

Variables	n=(100)	F (%)
Age group (year)	33-39	13(13)
	40-46	25(25)
	47-53	47(47)
	54-60	15(15)
	M±SD	47.90±6.8
Gender	Male	66(66)
	Female	34(34)
Level of education	Able to read and write	42(42)
	Primary School	27(27)
	Secondary School	19(19)
	Institute graduation	12(12)
Marital status	Married	88(88)
	Single	3(3)
	Widowed	6(6)
	Divorced	3(3)
Occupation	Governmental employed	26(26)
	Self-employed	38(38)
	Unemployment	12(12)
	Housewife	24(24)
Cigarette smoking	Non-smoker	57(57)
	Current smoker	10(10)
	Ex-smoker	33(33)
Number of cigarettes per day	Less than 1 pack/day	7(70)
	More than 1 pack/day	3(30)
Duration of cigarettes smoking	Less than 10 years	7(70)
	More than 10 years	3(30)
Family history	No	55(55)
	Yes	45(45)
Previous of PCI	No	89(89)
	Yes	11(11)
Duration diagnosis of heart diseases	Less than 1years	35(35)
	1-3 years	49(49)
	More than 3 years	16(16)

Table 2 shows cardiac and metabolic indicators of CAD patients concerning hypertension in the pre-test, more than half the percentage 69% of the patients were stage 1 hypertension, while compared to post-PCI, it was reduced to 30%. Regarding total cholesterol, at baseline, most of the patients 67% had their total cholesterol was more than (200 mg/dL). While in post-percutaneous coronary intervention more than half the pre-test (59%) of patients of a total cholesterol less than (200 mg/dL). Regarding triglycerides in the pre-PCI 58% of patients, triglycerides were more than 150 mg/dL, while in post-PCI, it was 53%. In relative terms, low-density lipoprotein (LDL) at baseline (64%) of the patient's LDL was more than 100 mg/dL after coronary intervention dropped to (58%). Moreover, the highest percentage 67% of patients HDL was less than 45mg/dl, whereas in post-

it was (43%) of patients' HDL more than 45 mg/dL. Relating to glycemic control, it was shown before PCI (65%) of patients had poor glycemic control (HbA1c $\geq 7\%$) compared to post-PCI nearly half of the patients had their HbA1c change to good glycemic control (HbA1c $< 7\%$). Furthermore, concerning body mass index (BMI), 52% of patients were overweight. While in post-education, 23% was within normal body weight. Concerning waist to hip ratio (WHR) male, and female patients 26%, 19% respectively, had median WHR, while in post-PCI, it changed to 24%, 17% consequently. In regard, to left ventricular ejection fraction (LVEF) 40% of patients have moderate LVEF, however, in post-coronary intervention, a higher percentage 41% of patients had mild LVEF [in Table 2].

Table 2: Cardiac and metabolic indicators of CAD patients of before and after PCI

Cardiac and metabolic indicators		Pre PCI F(%)	Post PCI F(%)
Hypertension	BP normal (120/<80 mmHg)	3(3)	7(7)
	Pre-hypertension (>120-139/85-89 mmHg)	10(10)	41(41)
	Hypertension stage 1(140-159/90-99 mmHg)	69(69)	30(30)
	Hypertension stage 2 (>160/>100 mmHg)	18(18)	12(12)
Total-cholesterol (TC)	Low (<200) mg/dL	33(33)	59(59)
	High (≥ 200) mg/dL	67(67)	41(41)
Triglycerides (TG)			
	Low (<150) mg/dL	42(42)	47(47)
	High (≥ 150) mg/dL	58(58)	53(53)
Low-density lipoprotein (LDL)			
	Low (<100) mg/dL	36(36)	42(42)
	High (≥ 100) mg/dL	64(64)	58(58)
High-density lipoprotein (HDL)			
	Low (<45) mg/dL	67(67)	57(57)
	High (≥ 45) mg/dL	33(33)	43(43)
Glycated hemoglobin (HbA1c)	Good control <7 %	35(35)	47(47)
	Poor control ≥ 7 %	65(65)	53(53)
Body mass index (BMI)	Normal (18.5-24.9)	17(17)	23(23)
	Overweight (25-29.9)	52(52)	40(40)
	Obese (≥ 30)	31(31)	37(37)
Waist-hip ratio of males (WHR)	Low (<0.95)		
		17(17)	12(24)
	Medium (0.95-1.0)	26(26)	24(24)
	High >1.0	23(23)	30(30)
Waist hip ratio of females (WHR)	Low ≤ 0.80	6(6)	3(3)
		19(19)	17(17)
	Medium 0.81-0.85	9(9)	14(14)
	High >0.86		
Left ventricular ejection fraction (LVEF)	Normal (50% to 70%)	24(24)	29(29)
	Mild (40% to 49%)	36(36)	41(29)
	Moderate (30% to 39%)	40(40)	30(30)

Table 3 illustrates the average mean score of quality of life of coronary artery disease patients before and after undergoing percutaneous coronary intervention. According to this table, the mean score sub-domains quality of life, in physical functioning were increased significantly (39.70 ± 11.99 to 44.90 ± 10.47 , P-value = 0.003), in role-physical (40.00 ± 12.76 to 48.75 ± 14.57 , P-value = 0.048), in general health (40.0 ± 17.38 to 44.21 ± 12.63 , P-value = 0.03), and social functioning (35.63 ± 13.58 to 41.50 ± 18.37 , P-value = 0.024). While no statistically significant difference in bodily pain (38.58 ± 13.98 to 44.10 ± 16.23 , P-value = 0.128), vitality

(39.90 ± 15.70 to 40.60 ± 14.31 , P-value = 0.753), in role-emotional (39.56 ± 14.05 to 41.33 ± 11.11 , P-value = 0.630), in mental health (39.67 ± 17.21 to 40.52 ± 11.91 , P-value = 0.815). Finally, the total mean score in the aspect of physical component summary (PCS) significantly raised from (39.57 ± 12.62 to 45.49 ± 11.63 , P-value < 0.001) compared to no significant in mental component summary (MCS) (38.69 ± 11.17 to 40.99 ± 9.37 , P-value = 0.103), in term of overall mean score quality of a life a highly significant improvement after performing percutaneous coronary intervention (39.13 ± 9.61 to 43.24 ± 8.07 , P= 0.001).

Table 3: Comparison mean score of quality of life (SF-36) before and after PCI

SF-36 Domains	Mean + SD		Mean difference	t-test	P-Value
	Pre PCI	Post PCI			
Physical functioning	39.70±11.99	44.90±10.47	-5.20	-3.10	0.003
Role-physical	40.00±12.76	48.75±14.57	-8.75	-2.00	0.048
Bodily pain	38.58±13.98	44.10±16.23	-5.52	-1.53	0.128
General health	40.00±17.38	44.21±12.63	-4.21	-2.17	0.033
PCS	39.57±12.62	45.49±11.63	-5.92	-0.32	<0.001
Vitality	39.90±15.70	40.60±14.31	-0.70	-0.32	0.753
Social functioning	35.63±13.58	41.50±18.37	-5.87	-2.29	0.024
Role-emotional	39.56±14.05	41.33±13.11	-1.66	-0.48	0.630
Mental health	39.67±17.21	40.52±11.91	-0.96	-0.24	0.815
MCS	38.69±11.17	40.99±9.37	-2.30	-1.65	0.103
Overall quality of life	39.13±9.61	43.24±8.07	-4.11	-3.58	0.001

PCS-Physical Component Summary; MCS-Mental Component Summary

Discussion

The present study findings demonstrate that the highest percentages were ages ranging between 47-53 years old, a high proportion of them were male, married, able to read and write, and the majority of patients self-employed. It also shows most of coronary artery disease patients were non-smokers, with no family history and coronary artery disease duration between 1 and 3 years. The current study finding was supported by a retrospective

cohort study from 2 large academic medical centers in Massachusetts that included patients who experienced a myocardial infarction, most of the patients were 45% years of ages between 44-50 years [18,19]. Also, findings agree with a study done by Huber et al., who determined the psychometric properties of the German HeartQoL, which was done among (n=489) patients with heart diseases from five centers in Austria and Switzerland to validate

the German version of the HeartQoL, who revealed that most of the patients were married (71.1%) and did not complete school (62.6%) and about half of them were self-employed (52.1%) [7]. Moreover, the study results come along with a descriptive, cross-sectional study on 210 patients with coronary artery disease in South Korea [20] to investigate the factors influencing HRQoL in patients with coronary artery disease who had received PCI. Most of the patients were married. Furthermore, the results of the present study agree with a cross-sectional study conducted on 106 patients referred to a cardiac clinic who attended the follow-up visit 3 months after coronary angioplasty during 2015-2016 in Rasht, Iran. Most of the patients were married (71.7%) nonsmokers (67%) no family history of heart disease; the majority of them had coronary artery disease duration between 1-3 years [21]. Concerning cardiac and metabolic indicators, the study findings found more than half a percentage of patients were stage 1 hypertensive. The current result findings are similar with study done by Gasecka et al., who evaluated HRQOL in patients after the first AMI treated in a reference cardiology centre in Poland and assessed which clinical variables affect HRQOL through Short Form (SF) 36 after AMI in patients undergoing PCI, who found that most of the 61% of patients had hypertension [15]. Also, the findings are compatible with a previous study on health-related quality of life (HRQL) among 305 patients with angina (N = 101), myocardial infarction (N = 123), or ischemic heart failure (N = 81) in Austria and Switzerland using German versions of the HeartQoL, and the Short Form -36 Health Survey (SF-36) done by Huber et al., who show that more than one-half of the patients had hypertension. Regarding lipid profile tests, the highest percentage of patients had hypercholesterolemia

and hypertriglyceridemia. [7]. Relative to LDL, most of the patients had high LDL, and low HDL. The results are supported by the study done in Baghdad City which most participants have dyslipidemia [22]. Concerning BMI, more than half a percentage was overweight. Also, it is agreed by a study that that revealed that most CAD patients were more likely to have a higher BMI [23]. In regard to glycemic control, it was shown before PCI most of the patients had poor glycemic control, the present study agrees with the study by Dzhun et al, which reported that a higher proportion of patients had HbA1c >7 % [24]. In addition to cigarette smoking, being overweight, hypercholesterolemia, hypertension, diabetes, and BMI significantly impact the quality of life [21,25]. The present study was supported by a study done by Pasdar et al, which found that the majority of study participants had a higher waist-hip ratio (WHR) than normal [26]. Concerning left ventricular ejection fraction (LVEF), the current study was a supported study that shows the LVEF pre-PCI was 52% between (40-50%) [15]. The overall quality of life better improved in physical aspects, it was similar to previous studies [17,27] shown that the effect of QoL was observed in most subdomains and was significant with regard to physical functioning, general health, social functioning and role-physical. Moreover, the current findings agree with prior studies conducted on a convenience sample of 119 Palestinian patients in 2020, using the Short Form-36 Health Survey applied 1 year after the coronary artery surgery [16]. Also, it came with study [28] that evaluated the quality of life (QOL) after percutaneous coronary intervention (PCI) using a short form health survey (SF-36) questionnaire at a tertiary care hospital in Pakistan. A total of 433 adult patients who underwent PCI, showed that the highest mean score was reported for PF, RE,

and RF were significantly higher in overall score, mostly in PCS than in the MCS score. An increasing trend, with respect to patients' perception of QoL compared to one year ago. Furthermore, the current study was a come along with follow-up a study done In Japan on a total of 118 patients treated with percutaneous coronary intervention (PCI) who revealed an improvement in the aspect of physical functioning in relation to quality of life was seen at 6 months after discharge [29].

CONCLUSION

To sum up, the quality of life of CAD patients who underwent PCI improved better in general specifically in the domains of general health, physical functioning, social functioning, and role physical. Also, the findings revealed that cardiometabolic risk indicators improved after percutaneous coronary intervention.

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CONFLICT OF INTEREST

The author reports no conflict of interests.

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