Scientific journal of physical and sports education(RSEPS)
(ISSN): 1135-1111 / EISSN 2661 - 7358
https://www.asjp.cerist.dz/en/PresentationRevue/452

Volume: 25/ N°: 01 (2026), p 109-120

Cardiac rehabilitation, A health benefit underused by women

SAID AISSA Samira [1]
STAPS ,Alger 3
Algerie
s.saidaissa82@yahoo.fr

Received: 08/10/2025 **Accepted: 16/12/2025**

Abstract
Cardiac rehabilitation involves a combination of therapeutic, educational, and physical retraining measures. Although heart disease is the leading cause of death worldwide, it typically occurs later in life in women. In fact, several factors discourage women from following a cardiovascular prevention and rehabilitation program. The aim of our work is to demonstrate the effect of cardiac rehabilitation and to confirm the under-participation of women in this physical retraining. This study was conducted in three cardiac rehabilitation departments (81 patients from the Turin clinic, 31 patients from the BENI MESSOUS hospital, and 65 patients from the CNMS. In our work, we opted to use a retrospective study and analysis of theoretical data. Despite the proven benefits of cardiac rehabilitation, it remains underutilized by women due to various obstacles.

Keywords: cardiac rehabilitation, heart disease, the woman. physical retraining .

Article info

[1] *SAID AISSA Samira*

Introduction

Cardiovascular disease is now the second leading cause of death in France, behind cancer. Worldwide, it is one of the main causes of disability, and the absolute number of deaths has therefore increased in even larger populations (L. Costil et al, 2009). The mortality rate from coronary heart disease was approximately twice as high among sedentary individuals. Most subsequent studies have fully confirmed these findings (W. Costill, 1998). Recent studies have shown that the profile of coronary heart disease patients has changed in recent years; they are younger, more obese, and generally smokers. Heart disease typically occurs later in women than in men (about ten years later). Although men and women have the same risk factors, each year there is a 5% increase in the number of women under 50 hospitalized for cardiovascular problems, while the figures remain stable for men.

Cardiac rehabilitation is a multidisciplinary program designed to improve symptoms, quality of life, and recurrence risk in patients with cardiovascular disease . Its indications are broad and include most heart conditions , however, there is under-participation in cardiac rehabilitation programs, particularly among women. The aim of our study is to show the benefits of cardiac rehabilitation in women, why women are more affected by cardiovascular disease, and the reasons why women participate less in cardiac rehabilitation programs than men. This is a retrospective study based on the records of cardiac patients. The study involved 81 patients from the Turin clinic, 31 patients from the BENI MESSOUS hospital, and 65 patients from the CNMS. In our work, we chose to use theoretical data cited in several research studies.

- This research is intended as a study addressing only part of the problem posed by the practice of cardiac rehabilitation programs, due to a lack of time and resources necessary to develop a more comprehensive study to address the issue raised in this study, entitled: What is the situation of cardiac rehabilitation among women?

Issues**:**

The WHO has defined cardiac rehabilitation as: “all activities necessary to favorably influence the progression of the disease and to ensure that patients achieve the best possible physical, mental, and social condition so that they can, through their own efforts, maintain or resume as normal a place as possible in community life.”

Women's physical capacity is lower than that of men. Continuous endurance training combined with muscle strengthening can improve this capacity in women. Physical capacity is lower in women when compared to men. However, the weaker the physical capacity, the better the benefit of cardiac rehabilitation. Physical endurance training continuously or in interval, associated to muscle strengthening can improve the physical capacity in women. Vascular risk factors correction is also an important step for the management of women with CAD. Therapeutic education and several available workshops help women to better understand their disease and to improve their self-management when they return home. Anxiety, depression, and sexual dysfunction frequently deteriorate the quality of life of our patients. Therefore, psychological management is also essential. Despite evidence of the benefits of cardiac rehabilitation on hard criteria such as morbidity and mortality, it remains underutilized, particularly among women, We will attempt to answer the following questions :

- What effect does cardiac rehabilitation have on improving physical capacity in people with heart failure?
- Why are women more prone to heart disease ?
- Do women participate less in cardiac rehabilitation programs than men?
- What are the reasons for women's under-participation in cardiac rehabilitation programs?

Les Hypothèses :

We assume that:

- Cardiac rehabilitation improves physical capacity in people with heart failure.
- Several risk factors make women more susceptible to heart disease.
- women participate less in cardiac rehabilitation than men
- several factors discourage women from participating in rehabilitation.

The concepts defined in the research:

- ✓ **Adapted physical activity**: this refers to all movements, exercises, and different sports practiced by individuals with limited physical, mental, and psychological abilities caused by impairments in different bodily functions (Cairette Bracke 1993, p. 10). The medium-term objective is to prevent the complications mentioned above, particularly cardiovascular complications (M.N. Bendahmane, **2005).**
- ✓ **Health-related physical indicators:** Determinants of health-related physical fitness, i.e., the physical and physiological components of physical fitness that directly impact health status. They help the body function efficiently, but they also contribute to disease prevention and overall improvement in health and well-being. (S, TAILEB; K, SAIDAISSA. 2019)
- ✓ **Cardiac rehabilitation**: The World Health Organization defines cardiac rehabilitation as a set of activities necessary to positively influence the progression of the disease and improve physical and mental condition in order to resume as normal an activity as possible in society.

Similar studies:

- ✓ **Study N° 1:** This study was conducted by A. Rouab et al. from the Institute of Sports Science at the University of Algiers 3. It is entitled: "The impact of culture on the low level of female participation in sports in Algeria." The objective of this research is to highlight the importance of women's sports in Algeria and to confirm the importance of society's culture on women's participation in basketball (Dr. Boudjaatate AHMED .2017**).**
- ✓ **Study N° 2:** This study was conducted by doctoral student DERBALE Khadidja et al. It is entitled "The reasons why women participate in recreational sports activities to maintain their body image." The research aims to discover the reasons that led women to participate in recreational sports activities to maintain their body image and what motivated them to participate (K. Darbale et al., 2022).
- ✓ **Study N° 3** : This study was conducted by R, Tahri, and others from the Institute of Sports Science at the University of Algiers 3. It is entitled: "The role of recreational sports activities in improving the overall physical condition of trained women." The aim of this research is to highlight the importance of promoting a culture of women's sports participation due to its health, physical, and psychological benefits for women. (R. Tahri et al. 2021)

- **Materials & Methods:**

Research method: In our research work, we undertook a retrospective study, which best suits the nature of this research, requiring the analysis of files and monitoring of a physical retraining program practiced by people with heart failure.

- **Sample characteristics :**
  - ➢ the number of patients: The sample consists of three groups of patients, specifically selected from three physical rehabilitation centers:

- Clinic: 81 patients .
- BENI MESSOU Hospital: 31 patients .
- National Center for Sports Medicine (CNMS) : 65 patients .

- **Age :** 30 to 82 years old **.**
- **Sex :** men and women .
- **Types of diseases:** heart failure patients.

The predominant risk factors in this population are high blood pressure, smoking, diabetes, and dyslipidemia. Nearly half of them have more than two associated risk factors. A cardiologist conducts a thorough assessment of each patient, including an interview, clinical examination, electrocardiogram, echocardiogram, and stress test, in order to determine the level of risk. This assessment would have made it possible to check for contraindications (pericarditis, severe aortic stenosis, heart failure, etc.), but also to adapt physical exercise to the severity of the patient's condition.

- **the target population** : heart failure patients .
- **The cardiac rehabilitation protocol:**
- **TURIN clinic :**
  - Endurance training on an exercice bike or treadmill for 30 minutes ,
  - Gymnastics exercises for 30 minutes ,
  - Psychological counseling,,
  - Dietetics counseling,
  - Auto -hypnosis exercises.
- **BENI MESSOUS Hospital :**
  - Endurance training on an exercice bike or treadmill for 30 minutes ;
  - Gymnastics exercises for 10 minutes ;
  - A six-minute walk
- **The National Center for Sports Medicine (CNMS)** :
  - Endurance training on an exercice bike or treadmill for 30 minutes
  - Les exercices de résistance sur ergomètre ou tapis roulant .
  - Gymnastics exercises for 10 minutes .

The rehabilitation protocol used includes an average of ten minutes of warm-up for each session: 30 minutes of effective endurance exercises and ten minutes of recovery. The intensity of the effort is determined based on heart rate. For each patient, it is calculated based on a target heart rate to be achieved :

Target heart rate according to the Karvonen END al. formula :

HRR = resting HR + 60 to 70% (HRmax–resting HR) After performing a cardiac stress test on each patient until certain signs appeared (shortness of breath, muscle fatigue, paleness, dizziness, chest pain, electrical signs of ischemia or arrhythmia, and high blood pressure), all of these causes required the test to be stopped. Rehabilitation exercises are performed on ergometers, under electrical monitoring by scopes. It should be noted that the exercises are programmed for each patient by a physical therapist at the Turin clinic. The supervisory team includes a cardiologist, a sports doctor, nurses, and physical therapists. Blood pressure and heart rate are regularly recorded in a patient the monitoring file Each patient underwent an average of 20 rehabilitation sessions, at a rate of three sessions per week of cardiac rehabilitation. At the end of each patient's rehabilitation program . A cardiac stress test was performed and a new assessment was made by the cardiologist for each of them .

Specialists (dieticians, physical therapists, sports science specialists, psychologists) are involved in several group and individual sessions covering education, training, and assessment. An initial assessment

is carried out when the patient arrives, enabling their support needs to be determined and the support plan to be put in place. This is followed by a second assessment at the end of the treatment period to evaluate the patient's progress and the success of the treatment (SLL Marcadet (2024).

Presentation, interpretation, and discussion of results :

In our research work, we will present the sample and its characteristics, the conditions under which the experiment was conducted, before presenting the results in the form of tables and histograms for analysis and interpretation .

On this point, and taking into account certain theoretical data reported in some scientific works used in the bibliographic analysis .

Our study has limitations, particularly related to the comparative nature of the results, which may not cover all aspects involved and to be evaluated. in order to aspire to more reliable results compared to a retrospective and prospective study to determine the effect of cardiac rehabilitation on improving physical capacity in heart failure patients and the role of cardiac rehabilitation in women .

Presentation and analysis of results :

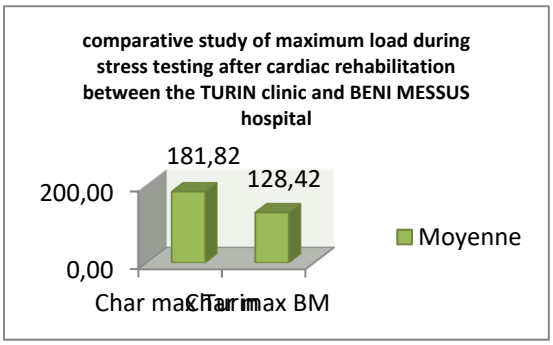
The analysis of our research results is divided into two parts:

The first part will present and interpret the data in the form of tables, graphs, and theoretical analysis of the parameters taken into account during the cardiac rehabilitation program at the TURIN clinic in PARIS. The second will focus on the comparative aspect of certain parameters between the selected rehabilitation centers: in our work, we carried out a comparison of parameters between the Turin clinic and the Beni Messous hospital and another comparison of parameters between the Beni Messous hospital and the CNMS.. Note that the results are expressed as a mean ± standard error, standard deviation, and variance. The statistical significance of the results was assessed using p-value analysis .

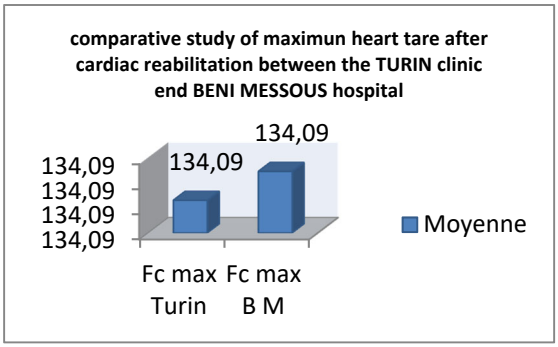
a- Présentation et analyse statistique des résultats des paramètres de comparaison entre la clinique Turin et l'hôpital Beni Mesouss :

Table n 1 ; Comparative study of parameters (maximum load, fc max; time, recovery time) between the Turin Clinic and Beni Hospital Messous

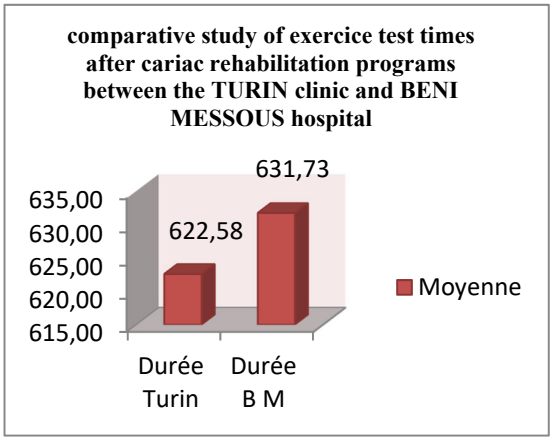
	Statistics	cardiac rehabilitation parameters			
		Maximum load	maximum heart rate	working hours	recovery time
the TURUN clinic	$\overline{X}$	128,42	134,09	622,58	214,20
	δ	44,81	26,23	143,41	47,58
	V	2007,50	687,88	20565,91	2263,93
Beni Messous Hospital	$\overline{X}$	181,82	134,09	631,73	235,88
	δ	34,32	15,73	201,08	54,53
	V	1177,84	247,46	40432,52	2973,48
the unit		Watts	Batts /min	Sec	Sec
T student		−6,13	$-4{,}69E^{-04}$	−0,27	−2,10
P- value		0,00	0 ,50	0,39	0,02
meaning		S	NS	NS	S



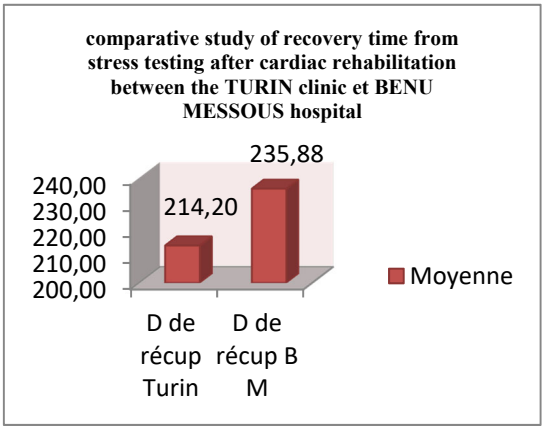
Histogram N°1 : maximum heart rate (Batts /min)



Histogram N° 2: maximum load, (watts)



Histogram N° 3: the duration (Seconds)



Histogram N° 4: recovery time (Seconds)

The maximum value for the maximum load is reached at the TURIN clinic, where it is around 181.82 watts. The value recorded at the Beni Messous hospital is around 128.42 watts. The difference according to the P-value analysis was significant, at 0.00. In other words, at a total significance threshold of alpha = 0.05, we can reject the null hypothesis of equality of means. In other words, the difference between the means is significant .

We recorded a difference in maximum heart rate values. The arithmetic means are 134.09 beats / minute at the Turin clinic and 134.09 beats / minute at the Beni Messous hospital . The difference established on the basis of the p-value analysis is 0.50, which translates into statistical insignificance, that is to say, at a total significance threshold of alpha = 0.05, we cannot reject the null hypothesis of equality of means. In other words, the difference between the means is not significant.

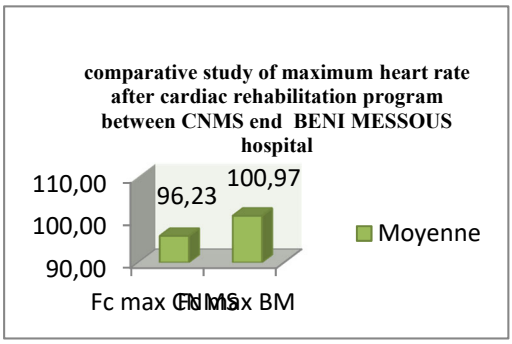
We recorded a difference in duration values. Indeed, the arithmetic means are 622.58 seconds at the Turin clinic and 631.73 seconds at the Beni Messous hospital; The difference established on the basis of the p-value analysis is 0.39, which translates into statistical insignificance, i.e., at a total significance threshold of alpha = 0.05, we cannot reject the null hypothesis of equality of means. In other words, the difference between the means is not significant.

The maximum value for recovery time was achieved at Beni Messous Hospital, where it was around 235.88 seconds. The value recorded at the Turin Clinic is around 214.20 seconds. 48. The difference in P-value analysis proved to be significant, at 0.02. In other words, at a total significance threshold of alpha = 0.05, we can reject the null hypothesis

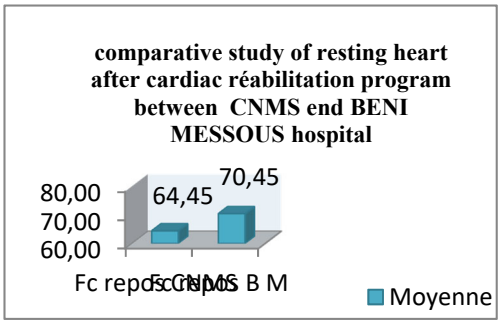
b/ Presentation of the results of the comparison parameters between CNMS and BENI MESSOUS Hospital during the rehabilitation program .

TABLE N° 2 : Comparative study of resting heart rate, maximum heart rate, and recovery heart rate between CNMS and Beni Messous Hospital

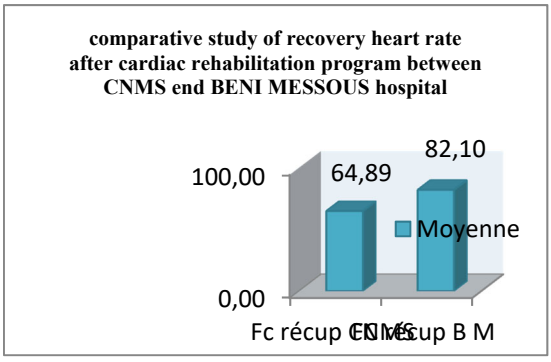
The periods	Statistics	cardiac rehabilitation parameters		
		resting heart rate	maximum heart rate	recovery heart rate
CNMS hospital	$\overline{X}$	64,45	96,23	64,89
	δ	7,19	12,10	7,26
	V	51,66	146,52	52,66
BEN MESSOUS hospital	$\overline{X}$	70,45	100,97	82,10
	δ	8,12	9,50	7,85
	V	65,92	90,23	61,56
Unit		Batts/min	Batts/min	Batts/min
T student		−3,67	−1,91	−10,58
V/Prob		2,01E $^{-04}$	0,03	0,00
significance		S	S	S



Histogramme N°5 : Resting heart rate



Histogram N°6 : Maximum heart rate (Bts / min)



Histogram N° 7 : recovery heart rate (Bts / min)

https://www.asjp.cerist.dz/en/PresentationRevue/452
revue.ieps.alger@univ-alger3.dZ
RSEPS SCIENTIFIC JOURNAL OF PHYSICAL AND SPORTS EDUCATION

We recorded a difference in resting heart rate values for the two hospitals. The arithmetic means are 64.45 beats/min at CNMS and 70.45 beats/min at Beni Messous Hospital. The difference established on the basis of the p-value analysis is 2.01E —04, which translates into statistical significance, that's to say a total significance threshold of alpha = 0.05, we can reject the null hypothesis of equality of means. In other words, the difference between the means is significant .

The maximum value for maximum heart rate is reached at Beni Messous Hospital, where it is around 100.97 beats / minute. The value recorded at CNMS is around 96.23 beats / minute. As for the evolution of the standard deviation curve, 12.10 was recorded at CNMS and 9.50 at BEN MESSOUS Hospital. It should be noted that the variance values for the two hospitals are 146.52 and 90.2, respectively. The difference in P-value analysis was significant at 0.03. In other words, at a total significance threshold of alpha = 0.05, we can reject the null hypothesis of equality of means. In other words, the difference between the means is significant .

We recorded a difference in recovery heart rate values for the two hospitals. The arithmetic means are 64.82 beats/min at CNMS and 82.10 beats/min at Beni Messous Hospital. The difference established on the basis of the P-value analysis is 0.00, which translates into statistical significance, that's to say , the total significance threshold alpha = 0.05, we can reject the null hypothesis of equality of means. In other words, the difference between the means is significant .

Discussion of the results of the comparison between the Turin clinic and the Beni Messous hospital:

By comparing the results between the Turin clinic and the Beni Messous hospital, and through P-value analysis, we found that the difference between the means of the following parameters is significant, such as recovery time and maximum load. We observed that the maximum load value at the Turin clinic is higher than that at the Beni Messous hospital, at 181.82 watts, while at the Beni Messous hospital, it is 128.42 watts. We observed the same difference in recovery time between the Turin clinic and the Beni Messous hospital, which is 235.88 seconds and 214.88 seconds, respectively.

Citing theoretical data on maximum heart rate, we observe an increase followed by stabilization or a slower change in heart rate, and then a slight decrease during recovery phases, which allows us to observe the quality of recovery (S, Benhammou et al., 2019).

According to Jean-Paul BOUNHOURE, physical exertion causes an increase in heart rate proportional to the intensity of the exertion. Training reduces the resting heart rate and the rate of increase in heart rate during exercise. There is a reduction in blood pressure at rest and during submaximal exercise (Annals of Physical and Rehabilitation Medicine, Volume 54, No. S1, page e157, October 2011).

on comparant ces résultats théoriques à ceux de notre travail, on a observé dans les données de l'épreuve d'effort réalisée à la clinique Turin que la fréquence cardiaque maximale augmente de 116 bAttts / min lors du première épreuve d'effort jusqu'à 134 batts / min, on a constaté qu'il ya une bonne réponse à la réadaptation cardiaque (*Bull. Acad. Natle Méd.*, 2014, *198*, no 3, 491-499, séance du 18 mars 2014)

Based on the theoretical results, this allows us to confirm that : "there is an improvement in physical capacity in heart failure patients through a cardiac rehabilitation program."

- **training parameters** :

The parameters for comparison between CNMS and BENI MESSOUS Hospital, such as resting heart rate, maximum heart rate, recovery heart rate, maximum workload, and exercise time, and by analyzing the p-value of these parameters, we observed that the difference between the means is significant.

According to Dr. Bénédicte Vergès, regular physical training improves physical performance: increased maximum exercise capacity, resulting in an increase in the Ttime and power of maximum effort and peak VO2 (Cardiac Rehabilitation Unit, Dijon University Hospital) Cardio&Sport• N°8). By comparing the results obtained in this research with theoretical results, we found that the improvement favors the CNMS. Therefore, we observed that the resting heart rate at Beni Messous is 70.45 bpm, while it is 64.45 bpm at the CNMS, and for recovery heart rate values, we recorded 64.89 bpm at the CNMS and 82. 10 beats/min at Beni Messous Hospital. We also recorded a difference in the values of other parameters, which was always in favor of the CNMS, such as maximum load and time which were 71.08 watts and 46.38 minutes at the CNMS and 59.03 watts and 28.23 seconds at the Beni Messous Hospital, respectively. This comparison allowed us to confirm that "power exercise is a good indicator of improved physical condition in physical retraining." Given that power exercises are included in the cardiac rehabilitation program carried out at the CNMS .The results obtained in the three selected rehabilitation centers confirm that **"cardiac rehabilitation improves physical capacity in heart failure patients**."

- **Why are women more prone to heart disease?**

For many reasons, women today are greatly affected by cardiovascular disease, to the point that mortality from these diseases exceeds that from breast cancer. But why is the female population so affected? How do they differ from men? To fully understand the issue, here are some explanations. This information may come as a surprise, but according to a report entitled "Observatoire du coeur et femme" (Heart and Women Observatory) published by the French Cardiology Federation in 2018 , Myocardial infarction (also known as a heart attack) is responsible for eight times more deaths than breast cancer. Similarly, women are much more affected than men on a daily basis. The French Cardiology Federation reports that "of the 147,000 people who die each year in France from cardiovascular disease, 54% are women." The reason? A lack of knowledge on the subject among most of the female population in France, a lack of awareness, but also a lifestyle that has gradually become modeled on male behavior, which is highly exposed to "new psychosocial risks." It should be noted that there are three key periods in women's hormonal lives: periods of hormone treatment use, particularly contraception, pregnancy, and menopause

- Contraception: Contraceptives containing synthetic estrogen promote blood clotting, which can cause blood clots that pose a serious risk to women's health.
- Menopause : During menopause, women tend to have more weight, have excess bad cholesterol, develop diabetes, etc. All these factors increase cholesterol plaques in the arteries, thereby raising the risk of cardiovascular disease.
- Pregnancy : To supply the placenta and nourish the fetus, the volume of blood processed by the heart of a pregnant woman increases from 4/5 liters to 6/7 liters of blood per minute. The heart rate increases and may reveal an undiagnosed cardiovascular disease.

- **Women participate less in cardiac rehabilitation programs than men**?

In our present study, our sample consists of three groups of patients, selected specifically from three cardiac rehabilitation centers: the Turin Clinic (81 patients), BENI MESSOUS Hospital (31 patients), and the National Center for Sports Medicine (CNMS, 65 patients). The number of patients includes both sexes in each cardiac rehabilitation center, so we chose to evaluate the percentage of both sexes.

.

TABLE N° 3 : Statistical analysis of the distribution of male and female numbers in the three cardiac rehabilitation centers

Les centres	Men		Women		degree of freedom	critical value X^2_t	Error α	chi-square test	statistical significance
TURUN clinic	%	frequency	%	frequency	1	3,84	0,05	18,17	Significant difference between H and F
	74 ,66	60	25, 34	21					
CNMS hospital	90,65	59	9,35	6	1	3,84	0,05	43 ,14	Significant difference between H and F
BENI MESSOUS hospital	94,62	29	5,42	2	1	3,84	0,05	23,51	Significant difference between H and F

We recorded a high percentage of males at the TURUN clinic, which is 74.66%. For females, we recorded a value of 25.34%, and the chi-square value is 18.17. Indeed, the difference established on the basis of the chi-square analysis is statistically significant, that is to say, at a total significance level of alpha = 0.05, we can reject the null hypothesis of equality of means. In other words, the difference between the means is significant.

We recorded a high percentage of males at CNMS, which is 90.65%, and 9.35% for females. The chi-square value is 43.14. Indeed, the difference established on the basis of the chi-square analysis is statistically significant, that is to say, at a total significance level of alpha = 0.05, we can reject the null hypothesis of equality of means. In other words, the difference between the means is significant.

We recorded a high percentage of males at Beni Messous Hospital, at 94.62%, compared to 5.42% for females, with a chi-square value of 23.51. the difference established on the basis of the chi-square analysis is statistically significant, that is to say, at the total significance level alpha = 0, we can reject the null hypothesis of equality of means. In other words, the difference between the means is significant.

- A 2014 study, also conducted by Dr. Grace's group, showed that 39% of women participate in rehabilitation, compared to 45% of men.
- Moore [5] showed that 50% of women who were offered rehabilitation refused due to fear or dislike of physical exercise. Among these women, three months after the end of rehabilitation, only 48% continued to exercise.

- Dr. Grace and her team hypothesized that outcomes would be significantly better in women-only programs.
- According to the results from three cardiac rehabilitation centers, which showed significant differences between the two sexes after chi-square statistical analysis and based on theoretical results, this confirms that:

Women participate less in rehabilitation programs than men.

Conclusion :

This study demonstrates that cardiac rehabilitation is beneficial. It improves patients' quality of life by enhancing their functional capacity and controlling their cardiovascular risk factors. It also enables optimal and comprehensive care for cardiac patients, which improves treatment compliance and adherence.

In our work, we have found that women participate less in cardiac rehabilitation programs than men. Although women are more prone to heart disease and despite the beneficial effects of cardiac rehabilitation, it remains underutilized among women. Indeed, several barriers discourage women from following a cycle of cardiovascular prevention and rehabilitation even after an acute coronary event. These barriers may be cultural, domestic, familial, rheumatological, or due to fear of physical exercise. Women's physical capacity is lower than that of men, but the lower the physical capacity, the more beneficial rehabilitation is. Women participate less in cardiac rehabilitation than men due to multiple factors, including lack of time due to family responsibilities, organizational and transportation difficulties, and sometimes medical guidance or programs that are not always tailored to their specific needs. Barriers such as lack of family support, fear of overly intense training, depression, and anxiety can also hinder their participation .

Continuous endurance training combined with muscle strengthening can improve this capacity in women. Correcting risk factors is an important step in the management of coronary artery disease. Therapeutic education and various workshops enable patients to better understand their conditions and manage themselves more effectively when they return home. Anxiety, depression, and sexual dysfunction frequently affect our patients' quality of life. Psychological care in our departments is essential, and in order to overcome the barriers preventing women from participating in cardiac rehabilitation programs, it is preferable to offer programs specifically for women (M. Ghanem et al. (2016)). A cardiac rehabilitation program specifically designed for women can encourage them to engage in good cardiac rehabilitation practices.

Bibliographic references :

1. Annals of Physical and Rehabilitation Medicine (2011)Volume 54, n° S1page 157
2. Bull. Acad. Natle Méd., 2014, *198*, no 3, 491-499, séance du 18 mars 2014
3. Cairette Bracke, (1993) .Activité physique et sportive adaptée pour personnes handicapes mentale. Université Brussel
4. http://www.doctissimo.fr
5. K.SAID AISSA .Etude de l'évolution de certains paramètres physiologiques sous l'effet du jeunes (ramadhan) chez les sportifs de haut niveau. revue des sciences et technologie des activités physiques et sportives, VOL 4, N° 4 , P 113-1116 .
6. KOTZKI N.et al ; (2003) .maladie coronarienne et réadaptation. édition MASSON PARIS 1 J.M.JAIS .la réadaptation du coronarien »département de médecine, dévision de cardiologie, hôpital Américain de paris, Neuilly /Seine
7. N.M.Bendahmane .les activités physiques adaptées chez les obéses .revue sciences et technologie des activités physiques et sportives, VOL 5 , N° 5 , P 101-104 .
8. S. Benhammou et al. Proposition d'un test d'effort intermittent pour déterminer la vitesse maximale aérobie (80/20VMA) .revue des sciences et technologie des activités physiques et sportives, VOL 16, N° 2 , 2019 , P 95 -107 , 2019
9. S. TAILEB ; K.SAIDAISSA. Impact de l'exercice aérobie combiné au jeune du ramadan sur quelques indices physiques et biologiques liées à la santé chez les femmes .revue des sciences et technologie des activités physiques et sportives, VOL 16, N° 2, 2019, P 80-94.
10. Unité de réadaptation cardiaque, CHU Dijon) Cardio&Sport• n°8
11. W .COSTILL (1998). physiologie du sport et de l'exercice physique. édition De Boeck
12. WEINECK. J. (1986). Manuel d'entrainement .Ed. Vigot . Paris. Page 6

المراجع باللغة العربية :

1. ط. بن صخرية , ح.بن زيدان " أثر برنامج أنشطة بدنية مكيفة لتحسين بعض عناصر اللياقة البدنية لكبار السن 70 – 60 "' مجلة العلوم و التكنولوجية للنشاطات البدنية و الرياضية ،مجلد 16 ، العدد 2 مكرر ، 2012 ، ص 317 – 330