



كلية الطب
والصيدلة - مراكش
FACULTÉ DE MÉDECINE
ET DE PHARMACIE - MARRAKECH

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Evaluation of occurrence of arm lymphedema after breast cancer treatment

THESIS

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By

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BORN ON 23 May 1995

TO OBTAIN A MEDICAL DOCTORATE

KEYWORDS:

Arm lymphedema - Incidence - Risk factors - Breast cancer

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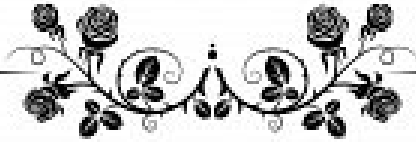
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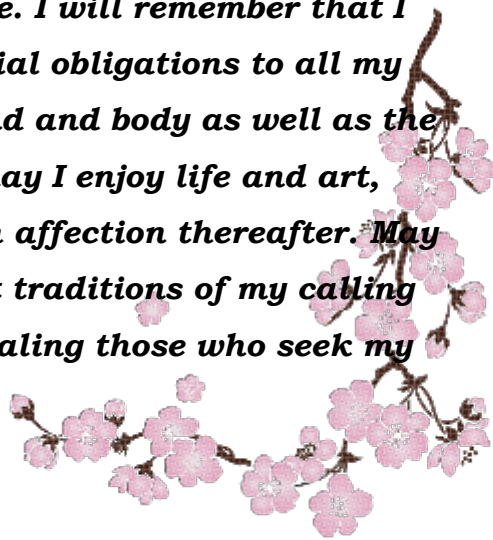
بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ





Hippocratic Oath

I swear to fulfill, to the best of my ability and judgment, this covenant: I will respect the hard-won scientific gains of those physicians in whose steps I walk, and gladly share such knowledge as is mine with those who are to follow. I will apply, for the benefit of the sick, all measures [that] are required, avoiding those twin traps of overtreatment and therapeutic nihilism. I will remember that there is art to medicine as well as science, and that warmth, sympathy, and understanding may outweigh the surgeon's knife or the chemist's drug. I will not be ashamed to say "I know not," nor will I fail to call in my colleagues when the skills of another are needed for a patient's recovery. I will respect the privacy of my patients, for their problems are not disclosed to me that the world may know. Most especially must I tread with care in matters of life and death. If it is given me to save a life, all thanks. But it may also be within my power to take a life; this awesome responsibility must be faced with great humbleness and awareness of my own frailty. Above all, I must not play at God. I will remember that I do not treat a fever chart, a cancerous growth, but a sick human being, whose illness may affect the person's family and economic stability. My responsibility includes these related problems, if I am to care adequately for the sick. I will prevent disease whenever I can, for prevention is preferable to cure. I will remember that I remain a member of society, with special obligations to all my fellow human beings, those sound of mind and body as well as the infirm. If I do not violate this oath, may I enjoy life and art, respected while I live and remember with affection thereafter. May I always act so as to preserve the finest traditions of my calling and may I long experience the joy of healing those who seek my help.



LIST OF PROFESSORS

UNIVERSITE CADI AYYAD
FACULTE DE MEDECINE ET DE PHARMACIE
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Doyens Honoraires : Pr. Badie Azzaman MEHADJI
: Pr. Abdelhaq ALAOUI YAZIDI

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Vice doyen à la Recherche et la coopération : Pr. Hanane RAISS
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Liste nominative du personnel enseignants chercheurs permanents

N°	Nom et Prénom	Cadre	Spécialité
01	BOUSKRAOUI Mohammed (Doyen)	P.E.S	Pédiatrie
02	CHOULLI Mohamed Khaled	P.E.S	Neuro pharmacologie
03	KHATOURI Ali	P.E.S	Cardiologie
04	NIAMANE Radouane	P.E.S	Rhumatologie
05	AIT BENALI Said	P.E.S	Neurochirurgie
06	KRATI Khadija	P.E.S	Gastro-entérologie
07	SOUMMANI Abderraouf	P.E.S	Gynécologie-obstétrique
08	RAJI Abdelaziz	P.E.S	Oto-rhino-laryngologie
09	KISSANI Najib	P.E.S	Neurologie

10	SARF Ismail	P.E.S	Urologie
11	MOUTAOUAKIL Abdeljalil	P.E.S	Ophthalmologie
12	AMAL Said	P.E.S	Dermatologie
13	ESSAADOUNI Lamiaa	P.E.S	Médecine interne
14	MANSOURI Nadia	P.E.S	Stomatologie et chirurgie maxillo faciale
15	MOUTAJ Redouane	P.E.S	Parasitologie
16	AMMAR Haddou	P.E.S	Oto-rhino-laryngologie
17	ZOUHAIR Said	P.E.S	Microbiologie
18	CHAKOUR Mohammed	P.E.S	Hématologie biologique
19	EL FEZZAZI Redouane	P.E.S	Chirurgie pédiatrique
20	YOUNOUS Said	P.E.S	Anesthésie-réanimation
21	BENELKHAIAT BENOMAR Ridouan	P.E.S	Chirurgie générale
22	ASMOUKI Hamid	P.E.S	Gynécologie-obstétrique
23	BOUMZEBRA Drissi	P.E.S	Chirurgie Cardio-vasculaire
24	CHELLAK Saliha	P.E.S	Biochimie-chimie
25	LOUZI Abdelouahed	P.E.S	Chirurgie-générale
26	AIT-SAB Imane	P.E.S	Pédiatrie
27	GHANNANE Houssine	P.E.S	Neurochirurgie
28	ABOULFALAH Abderrahim	P.E.S	Gynécologie-obstétrique
29	OULAD SAIAD Mohamed	P.E.S	Chirurgie pédiatrique
30	DAHAMI Zakaria	P.E.S	Urologie
31	EL HATTAOUI Mustapha	P.E.S	Cardiologie
32	ELFIKRI Abdelghani	P.E.S	Radiologie
33	KAMILI El Ouafi El Aouni	P.E.S	Chirurgie pédiatrique
34	MAOULAININE Fadl mrabih rabou	P.E.S	Pédiatrie (Néonatalogie)
35	MATRANE Aboubakr	P.E.S	Médecine nucléaire
36	AIT AMEUR Mustapha	P.E.S	Hématologie biologique
37	AMINE Mohamed	P.E.S	Epidémiologie clinique
38	EL ADIB Ahmed Rhassane	P.E.S	Anesthésie-réanimation
39	MANOUDI Fatiha	P.E.S	Psychiatrie
40	CHERIF IDRISSE EL GANOUNI Najat	P.E.S	Radiologie
41	BOURROUS Monir	P.E.S	Pédiatrie

42	ADMOU Brahim	P.E.S	Immunologie
43	TASSI Noura	P.E.S	Maladies infectieuses
44	NEJMI Hicham	P.E.S	Anesthésie-réanimation
45	LAOUAD Inass	P.E.S	Néphrologie
46	EL HOUDZI Jamila	P.E.S	Pédiatrie
47	FOURAJI Karima	P.E.S	Chirurgie pédiatrique
48	ARSALANE Lamiae	P.E.S	Microbiologie-virologie
49	BOUKHIRA Abderrahman	P.E.S	Biochimie-chimie
50	KHALLOUKI Mohammed	P.E.S	Anesthésie-réanimation
51	BSISS Mohammed Aziz	P.E.S	Biophysique
52	EL OMRANI Abdelhamid	P.E.S	Radiothérapie
53	SORAA Nabila	P.E.S	Microbiologie-virologie
54	KHOUCHANI Mouna	P.E.S	Radiothérapie
55	JALAL Hicham	P.E.S	Radiologie
56	OUALI IDRISSE Mariem	P.E.S	Radiologie
57	ZAHLANE Mouna	P.E.S	Médecine interne
58	BENJILALI Laila	P.E.S	Médecine interne
59	NARJIS Youssef	P.E.S	Chirurgie générale
60	RABBANI Khalid	P.E.S	Chirurgie générale
61	HAJJI Ibtissam	P.E.S	Ophtalmologie
62	EL ANSARI Nawal	P.E.S	Endocrinologie et maladies métabolique
63	ABOU EL HASSAN Taoufik	P.E.S	Anesthésie-réanimation
64	SAMLANI Zouhour	P.E.S	Gastro-entérologie
65	LAGHMARI Mehdi	P.E.S	Neurochirurgie
66	ABOUSSAIR Nisrine	P.E.S	Génétique
67	BENCHAMKHA Yassine	P.E.S	Chirurgie réparatrice et plastique
68	CHAFIK Rachid	P.E.S	Traumato-orthopédie
69	MADHAR Si Mohamed	P.E.S	Traumato-orthopédie
70	EL HAOURY Hanane	P.E.S	Traumato-orthopédie
71	ABKARI Imad	P.E.S	Traumato-orthopédie
72	EL BOUIHI Mohamed	P.E.S	Stomatologie et chirurgie maxillo faciale
73	LAKMICHI Mohamed Amine	P.E.S	Urologie
74	AGHOUTANE El Mouhtadi	P.E.S	Chirurgie pédiatrique
75	HOCAR Ouafa	P.E.S	Dermatologie
76	EL KARIMI Saloua	P.E.S	Cardiologie

77	EL BOUCHTI Imane	P.E.S	Rhumatologie
78	AMRO Lamyae	P.E.S	Pneumo-phtisiologie
79	ZYANI Mohammad	P.E.S	Médecine interne
80	GHOUNDALE Omar	P.E.S	Urologie
81	QACIF Hassan	P.E.S	Médecine interne
82	BEN DRISS Laila	P.E.S	Cardiologie
83	MOUFID Kamal	P.E.S	Urologie
84	QAMOUSS Youssef	P.E.S	Anesthésie réanimation
85	EL BARNI Rachid	P.E.S	Chirurgie générale
86	KRIET Mohamed	P.E.S	Ophtalmologie
87	BOUCHENTOUF Rachid	P.E.S	Pneumo-phtisiologie
88	ABOUCHADI Abdeljalil	P.E.S	Stomatologie et chirurgie maxillo faciale
89	BASRAOUI Dounia	P.E.S	Radiologie
90	RAIS Hanane	P.E.S	Anatomie Pathologique
91	BELKHOU Ahlam	P.E.S	Rhumatologie
92	ZAOUI Sanaa	P.E.S	Pharmacologie
93	MSOUGAR Yassine	P.E.S	Chirurgie thoracique
94	EL MGHARI TABIB Ghizlane	P.E.S	Endocrinologie et maladies métaboliques
95	DRAISS Ghizlane	P.E.S	Pédiatrie
96	EL IDRISSE SLITINE Nadia	P.E.S	Pédiatrie
97	RADA Noureddine	P.E.S	Pédiatrie
98	BOURRAHOUE Aicha	P.E.S	Pédiatrie
99	MOUAFFAK Youssef	P.E.S	Anesthésie-réanimation
100	ZIADI Amra	P.E.S	Anesthésie-réanimation
101	ANIBA Khalid	P.E.S	Neurochirurgie
102	TAZI Mohamed Illias	P.E.S	Hématologie clinique
103	ROCHDI Youssef	P.E.S	Oto-rhino-laryngologie
104	FADILI Wafaa	P.E.S	Néphrologie
105	ADALI Imane	P.E.S	Psychiatrie
106	ZAHLANE Kawtar	P.E.S	Microbiologie- virologie
107	LOUHAB Nisrine	P.E.S	Neurologie
108	HAROU Karam	P.E.S	Gynécologie-obstétrique
109	BASSIR Ahlam	P.E.S	Gynécologie obstétrique
110	BOUKHANNI Lahcen	P.E.S	Gynécologie obstétrique
111	FAKHIR Bouchra	P.E.S	Gynécologie-obstétrique

112	BENHIMA Mohamed Amine	P.E.S	Traumatologie–orthopédie
113	HACHIMI Abdelhamid	P.E.S	Réanimation médicale
114	EL KHAYARI Mina	P.E.S	Réanimation médicale
115	AISSAOUI Younes	P.E.S	Anesthésie–réanimation
116	BAIZRI Hicham	P.E.S	Endocrinologie et maladies métaboliques
117	ATMANE El Mehdi	P.E.S	Radiologie
118	EL AMRANI Moulay Driss	P.E.S	Anatomie
119	BELBARAKA Rhizlane	P.E.S	Oncologie médicale
120	ALJ Soumaya	P.E.S	Radiologie
121	OUBAHA Sofia	P.E.S	Physiologie
122	EL HAOUATI Rachid	P.E.S	Chirurgie Cardio–vasculaire
123	BENALI Abdeslam	P.E.S	Psychiatrie
124	MLIHA TOUATI Mohammed	P.E.S	Oto–rhino–laryngologie
125	MARGAD Omar	P.E.S	Traumatologie–orthopédie
126	KADDOURI Said	P.E.S	Médecine interne
127	ZEMRAOUI Nadir	P.E.S	Néphrologie
128	EL KHADER Ahmed	P.E.S	Chirurgie générale
129	LAKOUICHMI Mohammed	P.E.S	Stomatologie et chirurgie maxillo faciale
130	DAROUASSI Youssef	P.E.S	Oto–rhino–laryngologie
131	BENJELLOUN HARZIMI Amine	P.E.S	Pneumo–phtisiologie
132	FAKHRI Anass	P.E.S	Histologie–embyologie cytogénétique
133	SALAMA Tarik	P.E.S	Chirurgie pédiatrique
134	CHRAA Mohamed	P.E.S	Physiologie
135	ZARROUKI Youssef	P.E.S	Anesthésie–réanimation
136	AIT BATAHAR Salma	P.E.S	Pneumo–phtisiologie
137	ADARMOUCH Latifa	P.E.S	Médecine communautaire (médecine préventive, santé publique et hygiène)
138	BELBACHIR Anass	P.E.S	Anatomie pathologique
139	HAZMIRI Fatima Ezzahra	P.E.S	Histologie–embyologie cytogénétique
140	EL KAMOUNI Youssef	P.E.S	Microbiologie–virologie
141	SERGHINI Issam	P.E.S	Anesthésie–réanimation
142	EL MEZOUARI El Mostafa	P.E.S	Parasitologie mycologie
143	ABIR Badreddine	P.E.S	Stomatologie et chirurgie maxillo faciale
144	GHAZI Mirieme	P.E.S	Rhumatologie
145	ZIDANE Moulay Abdelfettah	P.E.S	Chirurgie thoracique

146	LAHKIM Mohammed	P.E.S	Chirurgie générale
147	MOUHSINE Abdelilah	P.E.S	Radiologie
148	TOURABI Khalid	P.E.S	Chirurgie réparatrice et plastique
149	NADER Youssef	Pr Ag	Traumatologie–orthopédie
150	SEDDIKI Rachid	Pr Ag	Anesthésie–réanimation
151	ARABI Hafid	Pr Ag	Médecine physique et réadaptation fonctionnelle
152	BELHADJ Ayoub	Pr Ag	Anesthésie–réanimation
153	BOUZERDA Abdelmajid	Pr Ag	Cardiologie
154	ARSALANE Adil	Pr Ag	Chirurgie thoracique
155	ABDELFETTAH Youness	Pr Ag	Rééducation et réhabilitation fonctionnelle
156	REBAHI Houssam	Pr Ag	Anesthésie–réanimation
157	BENNAOUI Fatiha	Pr Ag	Pédiatrie
158	ZOUIZRA Zahira	Pr Ag	Chirurgie Cardio–vasculaire
159	SEBBANI Majda	Pr Ag	Médecine Communautaire (Médecine préventive, santé publique et hygiène)
160	ABDOU Abdessamad	Pr Ag	Chirurgie Cardio–vasculaire
161	HAMMOUNE Nabil	Pr Ag	Radiologie
162	ESSADI Ismail	Pr Ag	Oncologie médicale
163	MESSAOUDI Redouane	Pr Ag	Ophtalmologie
164	ALJALIL Abdelfattah	Pr Ag	Oto–rhino–laryngologie
165	LAFFINTI Mahmoud Amine	Pr Ag	Psychiatrie
166	RHARRASSI Issam	Pr Ag	Anatomie–pathologique
167	ASSERRAJI Mohammed	Pr Ag	Néphrologie
168	JANAH Hicham	Pr Ag	Pneumo–phtisiologie
169	NASSIM SABAH Taoufik	Pr Ag	Chirurgie réparatrice et plastique
170	ELBAZ Meriem	Pr Ag	Pédiatrie
171	BELGHMAIDI Sarah	Pr Ag	Ophtalmologie
172	FENANE Hicham	Pr Ag	Chirurgie thoracique
173	GEBRATI Lhoucine	Pr Hab	Chimie
174	FDIL Naima	Pr Hab	Chimie de coordination bio–organique
175	LOQMAN Souad	Pr Ass	Microbiologie et toxicologie environnementale
176	BAALLAL Hassan	Pr Ag	Neurochirurgie
177	BELFQUIH Hatim	Pr Ag	Neurochirurgie

178	MILOUDI Mouhcine	Pr Ag	Microbiologie–virologie
179	AKKA Rachid	Pr Ag	Gastro–entérologie
180	BABA Hicham	Pr Ag	Chirurgie générale
181	MAOUJOURD Omar	Pr Ag	Néphrologie
182	SIRBOU Rachid	Pr Ag	Médecine d'urgence et de catastrophe
183	EL FILALI Oualid	Pr Ag	Chirurgie Vasculaire périphérique
184	EL– AKHIRI Mohammed	Pr Ag	Oto–rhino–laryngologie
185	HAJJI Fouad	Pr Ag	Urologie
186	OUMERZOUK Jawad	Pr Ag	Neurologie
187	JALLAL Hamid	Pr Ag	Cardiologie
188	ZBITOU Mohamed Anas	Pr Ag	Cardiologie
189	RAISSI Abderrahim	Pr Ag	Hématologie clinique
190	BELLASRI Salah	Pr Ag	Radiologie
191	DAMI Abdallah	Pr Ass	Médecine Légale
192	AZIZ Zakaria	Pr Ass	Stomatologie et chirurgie maxillo faciale
193	ELOUARDI Youssef	Pr Ag	Anesthésie–réanimation
194	LAHLIMI Fatima Ezzahra	Pr Ag	Hématologie clinique
195	EL FAKIRI Karima	Pr Ass	Pédiatrie
196	NASSIH Houda	Pr Ag	Pédiatrie
197	LAHMINE Widad	Pr Ag	Pédiatrie
198	BENANTAR Lamia	Pr Ag	Neurochirurgie
199	EL FADLI Mohammed	Pr Ag	Oncologie médicale
200	AIT ERRAMI Adil	Pr Ag	Gastro–entérologie
201	CHETTATI Mariam	Pr Ag	Néphrologie
202	SAYAGH Sanae	Pr Ass	Hématologie
203	BOUTAKIOUTE Badr	Pr Ag	Radiologie
204	DOUIREK Fouzia	Pr Ass	Anesthésie–réanimation
205	EL HAKKOUNI Awatif	Pr Ass	Parasitologie mycologie
206	BELARBI Marouane	Pr Ass	Néphrologie
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208	CHETOUI Abdelkhalek	Pr Ass	Cardiologie
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210	EL AMIRI My Ahmed	Pr Ass	Chimie de Coordination bio–organique
211	CHAHBI Zakaria	Pr Ass	Maladies infectieuses
212	MEFTAH Azzelarab	Pr Ass	Endocrinologie et maladies métaboliques

213	ROUKHSI Redouane	Pr Ass	Radiologie
214	EL GAMRANI Younes	Pr Ass	Gastro-entérologie
215	ARROB Adil	Pr Ass	Chirurgie réparatrice et plastique
216	SALLAHI Hicham	Pr Ass	Traumatologie-orthopédie
217	ACHKOUN Abdessalam	Pr Ass	Anatomie
218	DARFAOUI Mouna	Pr Ass	Radiothérapie
219	EL-QADIRY Rabiy	Pr Ass	Pédiatrie
220	ELJAMILI Mohammed	Pr Ass	Cardiologie
221	HAMRI Asma	Pr Ass	Chirurgie Générale
222	ELATIQI Oumkeltoum	Pr Ass	Chirurgie réparatrice et plastique
223	BENZALIM Meriam	Pr Ass	Radiologie
224	ABOULMAKARIM Siham	Pr Ass	Biochimie
225	LAMRANI HANCHI Asmae	Pr Ass	Microbiologie-virologie
226	HAJHOUI Farouk	Pr Ass	Neurochirurgie
227	EL KHASSOUI Amine	Pr Ass	Chirurgie pédiatrique
228	SBAAI Mohammed	Pr Ass	Parasitologie-mycologie
229	FASSI Fihri Mohamed jawad	Pr Ass	Chirurgie générale
230	BENCHAFAI Ilias	Pr Ass	Oto-rhino-laryngologie
231	SLIOUI Badr	Pr Ass	Radiologie
232	EL JADI Hamza	Pr Ass	Endocrinologie et maladies métaboliques
233	AZAMI Mohamed Amine	Pr Ass	Anatomie pathologique
234	YAHYAOUI Hicham	Pr Ass	Hématologie
235	ABALLA Najoua	Pr Ass	Chirurgie pédiatrique
236	MOUGUI Ahmed	Pr Ass	Rhumatologie
237	SAHRAOUI Houssam Eddine	Pr Ass	Anesthésie-réanimation
238	AABBASSI Bouchra	Pr Ass	Pédopsychiatrie
239	SBAI Asma	Pr Ass	Informatique
240	HAZIME Raja	Pr Ass	Immunologie
241	CHEGGOUR Mouna	Pr Ass	Biochimie
242	RHEZALI Manal	Pr Ass	Anesthésie-réanimation
243	ZOUITA Btissam	Pr Ass	Radiologie
244	MOULINE Souhail	Pr Ass	Microbiologie-virologie
245	AZIZI Mounia	Pr Ass	Néphrologie
246	BENYASS Youssef	Pr Ass	Traumato-orthopédie
247	BOUHAMIDI Ahmed	Pr Ass	Dermatologie

248	YANISSE Siham	Pr Ass	Pharmacie galénique
249	DOULHOUSNE Hassan	Pr Ass	Radiologie
250	KHALLIKANE Said	Pr Ass	Anesthésie-réanimation
251	BENAMEUR Yassir	Pr Ass	Médecine nucléaire
252	ZIRAOUI Oualid	Pr Ass	Chimie thérapeutique
253	IDALENE Malika	Pr Ass	Maladies infectieuses
254	LACHHAB Zineb	Pr Ass	Pharmacognosie
255	ABOUDOURIB Maryem	Pr Ass	Dermatologie
256	AHBALA Tariq	Pr Ass	Chirurgie générale
257	LALAOUI Abdessamad	Pr Ass	Pédiatrie
258	ESSAFTI Meryem	Pr Ass	Anesthésie-réanimation
259	RACHIDI Hind	Pr Ass	Anatomie pathologique
260	FIKRI Oussama	Pr Ass	Pneumo-phtisiologie
261	EL HAMDAOUI Omar	Pr Ass	Toxicologie
262	EL HAJJAMI Ayoub	Pr Ass	Radiologie
263	BOUMEDIANE El Mehdi	Pr Ass	Traumato-orthopédie
264	RAFI Sana	Pr Ass	Endocrinologie et maladies métaboliques
265	JEBRANE Ilham	Pr Ass	Pharmacologie
266	LAKHDAR Youssef	Pr Ass	Oto-rhino-laryngologie
267	LGHABI Majida	Pr Ass	Médecine du Travail
268	AIT LHAJ El Houssaine	Pr Ass	Ophtalmologie
269	RAMRAOUI Mohammed-Es-said	Pr Ass	Chirurgie générale
270	EL MOUHAFID Faisal	Pr Ass	Chirurgie générale

LISTE ARRETEE LE 04/10/2023

DEDICATIONS

بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ

To my Mom and Dad,

Elhoussaine MOUHARIME and Zahra LAGHSAL,
I feel so honored and blessed to have you as my parents,
and I want to express my gratitude for your care and
support over the years. Thank you for instilling me with a
strong passion for learning and for doing everything
possible to put me on the path to greatness. I will never
forget the important values you have passed down to me
particularly perseverance and honesty. Words cannot
describe how important you are to me.

*This achievement would not have been possible without
your support, you are the best parents in the world, and I
owe my success to you.*

To my beloved Husband, Mohamed Reda ETTALBI,
Whose unwavering support, encouragement, and love have
been my guiding lights throughout the duration of this
study. Your patience and understanding have been my
pillars of strength. This thesis is as much a testament to our
shared commitment as it is to my individual endeavors.
Thank you for showing me what unconditional love is. Only
you can love me even when I'm annoying. Thank you for
believing in my capabilities, and all the motivating words
of encouragement in my 'down' moments, Thank you for
being my constant source of inspiration and for being
always there for me. With love and gratitude

To my Brother Hamza and sisters: Khadija and Kaoutar.

*Growing with you is the best thing in my life, although I am always annoying you, I would fight the world for you. I will do everything in my power to pave the path for you and assist you along the way. Kaoutar, you might think that you're all grown up now, well you're not! Annoying you is my favorite pass time (unfortunately for you). Keep growing great,
I'll always be behind you*

To my little nieces Arij and Maïssa,

You are my little angels, I pray to god you have a future as beautiful as you are. You're always going to be my little girls.

To my Uncle Mohamed LAGHSAL,

I dedicate this work to you to appreciate your support, and inspiration. You were always my idol and source of motivation since my young age. May God bless you and provide you with good health and joy.

To my large family,

To Mahlou, My uncles and my aunts, to all my lovely cousins

I would have liked to be able to mention each one by name.

Thank you for your encouragement and support throughout the years. In recognition of the great affection you have shown me and for the gratitude and sincere love I have for you. May our ties always remain strong and may GOD bring us happiness and help us to fulfill all our wishes.

I love you all.

To my childhood friend Hajar TIGLIFET

*I never knew that being friends with a person who is the absolute opposite of me would be so lovely, insightful and meaningful. You are the person I want to share beautiful events with, but also the darkest depressing ones. I don't believe in guardian angels, yet you proved to be mine over the course of 20 years of honest genuine friendship. 20 years! You inspire me to be the best version of myself; you help me overcome all scary challenges. You're my family!
I love you.*

To my dear friends and colleagues:

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You are the epitome of the best friends that everyone dreams of having. These eight years have been less painful thanks to you. I have always admired you for your generosity, your humor and especially your sincerity towards me. May our bonds of friendship last and endure InchAllah. I wish you a life full of joy, happiness and health.*

*To my friend, Dr Ouassim MANSOURI,
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*And lastly,
I want to thank me for believing in me,
I want to thank me for doing all this hard work.
I wanna thank me for never quitting.
I wanna thank me for trying to do more right than wrong.
I wanna thank me for being me at all times.
Mic drop*

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of this jury.

ABREVIATIONS

List of abbreviations

BCRL	:	Breast cancer related lymphedema
BC	:	Breast cancer
PL	:	Primary lymphedema
SL	:	Secondary lymphedema
SR	:	Self report
DASH	:	Disabilities of the Arm, Shoulder and Hand
ALND	:	Axillary lymph node dissection
SLND	:	Sentinel lymph node biopsy
RLNR	:	Regional <i>lymph node radiation</i>
RT	:	Radiation therapy
CT	:	<i>Chemotherapy</i>
HT	:	<i>Hormone therapy</i>
BMI	:	Body mass index
UOQ	:	Upper outer quadrant
UIQ	:	Upper inner quadrant
LOQ	:	Lower outer quadrant
LIQ	:	Lower inner quadrant
TTI	:	Time to treatment initiation

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INTRODUCTION

Breast cancer became the most commonly diagnosed cancer type in the world in 2020. IARC estimates that there were more than 2.26 million new cases of breast cancer and almost 685 000 deaths from breast cancer worldwide in 2020. Breast cancer was the most common cause of cancer death in women and the fifth most common cause of cancer death overall. [1]

In Morocco, breast cancer represents a serious public health problem. It's the first cancer among women and the third one of all registered cancer cases, the incidence of breast cancer have clearly increased during the last decade, the 2012 updated versions of the RCRC (Cancer Registry of Casablanca Region) and RCR (Cancer registry of Rabat) have reported a standardized incidence of 39, 9 and 49, 2 per 100.000 women respectively (RCRC, 2012; RCR, 2012).

In the region of Marrakech–safi, Through a retrospective study in 2020 spread over 10 years from January 1, 2007 to December 31, 2017 on all women treated for breast cancer in the obstetric gynecology service of the University hospital center MOHAMED VI in Marrakech, 1790 cases of breast cancer were identified. [2].

Lymphedema secondary to the treatment of breast cancer is a chronic and recurrent condition involving the lymphatic and blood systems [3].

The dysfunctional lymphatic system becomes less capable of performing the complete resorption of large protein molecules, and these remain in the interstitial space. The consequent tissue fibrosis and the increasing accumulation of fluid and proteins in this space can trigger neurological alterations such as pain or paresthesia, distortion in the shape of the limb, and increased risk of related complications [3,4]. Chronic lymphedema causes physical deficiencies and psychological stress, which worsens with the progression of the dysfunction, to reduce the discomfort of the patient and improve the quality of life, an accurate diagnosis of lymphedema is essential for prognosis and treatment planning [5].

The objective of this thesis is to determine, within our survey, the Incidence of breast cancer Related lymphedema as well as to a study the different Risk factors relating to the occurrence of lymphedema, while comparing them to other series in the literature

MATERIALS AND METHODS

I. Materials:

This is a cross sectional study carried out over a period of two years from January 1, 2018 to December 31, 2019 covering all women treated for breast cancer in the obstetrics and gynecology department of University Hospital center MOHAMED VI in Marrakesh.

We used medical files from the department's archives; we collected all the informations from the files including the phone number of patients,

Selected women with breast cancer treatment were invited to participate in this study,

We excluded some patients by the established criteria and the rest of patients were allocated

1. Inclusion criteria:

- Patients newly diagnosed with stage I-III cancer of the female breast
- Patients who had any type of breast cancer treatment (chemotherapy neoadjuvant, Radiotherapy, surgery) are eligible
- Patients who had Unilateral breast cancer treatment

2. Exclusion criteria:

- Pregnant women
- Patients who are homebound or dependent upon a walker or wheelchair for mobility
- Patients diagnosed enhanced lymphedema before surgery
- Hypertensive patients who are using diuretics
- Patients who had a bilateral breast cancer traitement
- Patients who had a previous cancer traitment before the year of study

II. Methods:

1. Data collection:

We used medical files from the obstetrics and gynecology department of University Hospital center MOHAMED VI in Marrakesh's archives; we collected all the informations from the files including the phone numbers of the patients.

The patients included in the study were invited to university hospital center mohamed VI and a form was completed by patients at the moment of clinical examination.

- **The questionnaire used:**

The form we developed for this research is validated by the department of physical medicine and rehabilitation of university hospital center mohamed VI in marrakech

It is divided into three parts (annex 1)

- **First part :**

Concerns information about Breast cancer history and treatment (age, time of diagnosis, therapeutic tools, and comorbidities..)

- **Second part:**

We evaluated the quality of life and the function of the arm. Using The "Disabilities of the Arm, Shoulder and Hand" (DASH) questionnaire.

It consists of 30 items related to symptoms and physical and social function; Scores range from 30 to 150, which are transformed to a 0 to 100 scale (the DASH score), with 0 reflecting good function and 100 reflecting symptoms at maximal intensity and hence considerable disability.⁶⁷.

The 30 main items of the DASH were used in this thesis. An official Arabic version (annex 2) of the DASH is also available and has been approved by the DASH Outcome Measure Institute for Work and Health.⁶⁷

- **Third part:**

Concerns measurement tools to define arm lymphedema presence:

- **Circumferences and volume :**



Certified lymphedema therapist performing circumference tape measurements on a patient with breast cancer related right upper extremity lymphedema

Figure 1. [138]

The outcome of the measurement of lymphedema was obtained through indirect measurement of volume, determined by the upper limb's circumference.

The limb volume was calculated from the circumference measurements, treating each segment of the limb as a pair of circumferences, formed by the measurement points of the circumference of the six points of the arm and forearm, called truncated cones. [6]

The volume of each arm is estimated using the formula for the volume of the frustum of a cone: $V = h * (C^2 + Cc + c^2)/(12 * \pi)$, where V is the volume of a segment of the upper extremity, C and c are the circumferences (in cm) at determined segments of the arm, and h is the distance between circumferences (C, c) in each segment (h = 7 cm was used). The arm circumference is measured at multiple segments. Each adjacent pair of measurements is used to estimate the volume of that segment. The volume estimates of all segments of each arm is summed to compute the estimated arm volume [19,142]

Lymphedema was considered when there was a difference greater than 2 cm in the perimetry of two or more predetermined points on the affected limb compared to the contralateral limb.[6], and when the volume of the ipsilateral arm was **200 cm³** or greater than that of the contralateral arm. [6,7]

2. Data analysis:

The continuous variables were represented as means or medians and compared with the student t-test.

The categorical variables were expressed as frequencies and percentages and compared with the Fisher's exact test.

We have used SPSS version 23 software for all statistical analysis. We defined the p-value as statistically significant when less than 0.05.

3. Ethical aspects :

The Research Ethics Committee of the Faculty of Medicine and Pharmacy of Marrakesh approved the study (N°354/2023). The data collected was strictly confidential. The research protocol did not affect the patient's health, safety, or privacy.

RESULTS

I. Results:

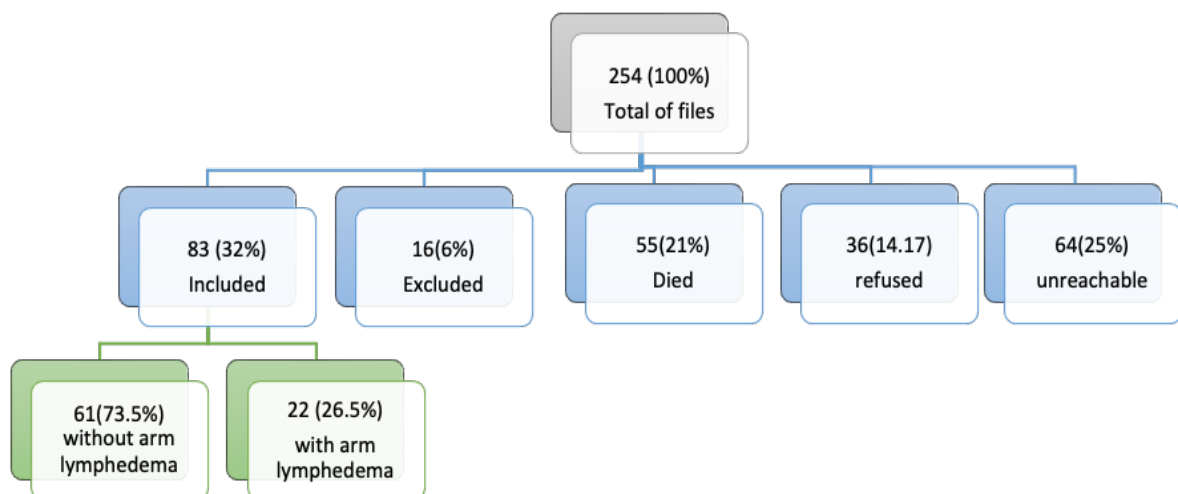
During the period of our study, spanning 2 years, the total number of breast cancer files that we were able to explore was 254.

Among 254 (100%) selected patients, 83 (32%) were included, 16 (6%) were excluded due to exclusion criteria,

36 (14.17%) Patient refused due to the distance from

Marrakech and the lack of financial means, 55 patients died (21%),

And 64 (25%) patients were inaccessible due to telephone unreachability.



Shema of study population.

1. Incidence of lymphedema :

The incidence of lymphedema was 26.5% after a median follow-up time of 4 years With minimum and maximum were 3 to 5 years

II. Population characteristics:

1. Age:

Among the patients diagnosed with arm lymphedema the mean age was around 48 years; the extremes were 29 and 66 years.

While the mean of age of patients without arm lymphedema was around 50 years; the extremes were 30 and 79 years

The age of patients was not statically significant ($p=0.42$) according to bivariate analysis

Tab. I : Distribution of age groups

Age group	Patients with lymphedema		Patients without lymphedema		P
	Number	Percentage%	Number	Percentage	
29-49	10	45.5	31	50.8	0.42
50-79	12	54.5	30	49.2	
Total	22	100%	61	100%	

2. Body mass index :

The mean of **body mass index** was 30 among patients with lymphedema and the minimum and maximum were 23,8 and 34,4.

Over 50% of our patients were in the obesity range.

While the mean of Body mass index in patients without lymphedema was 27 and the minimum and the maximum were 18,7 and 34,7, over 40% of them were in the overweight range.

Higher BMI seemed to be associated with BCRL according bivariate analysis ($p=0.04$)

Tab II: Distribution of BMI categories of patients

BMI	Lymphedema Present		Lymphedema Absent		P
	Number	Percentage%	Number	Percentage	
Underweight	0	0	0	0	0.04
Normal	2	9	16	26.2	
Overweight	7	31.9	28	45.9	
Obesity I	13	59.1	17	27.9	
Total	22	100	61	100	

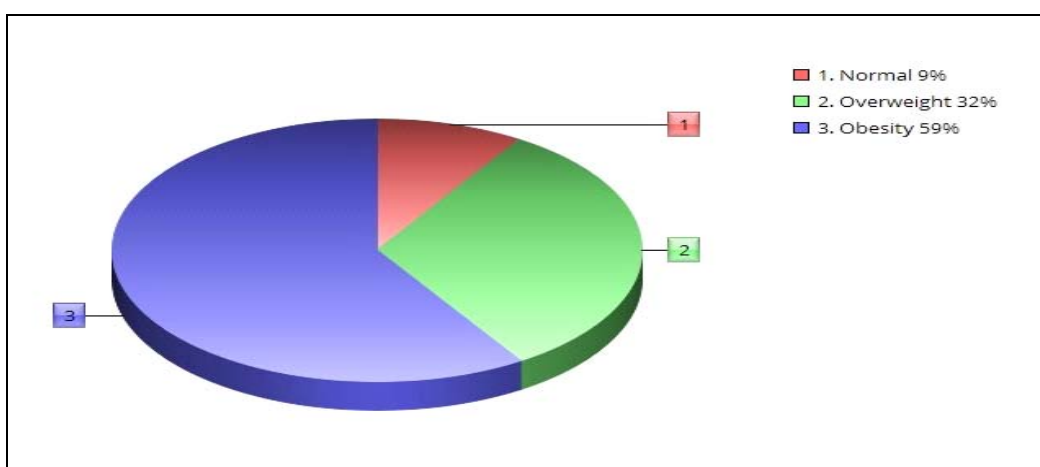


Figure 2: Distribution of BMI within patients with arm lymphedema

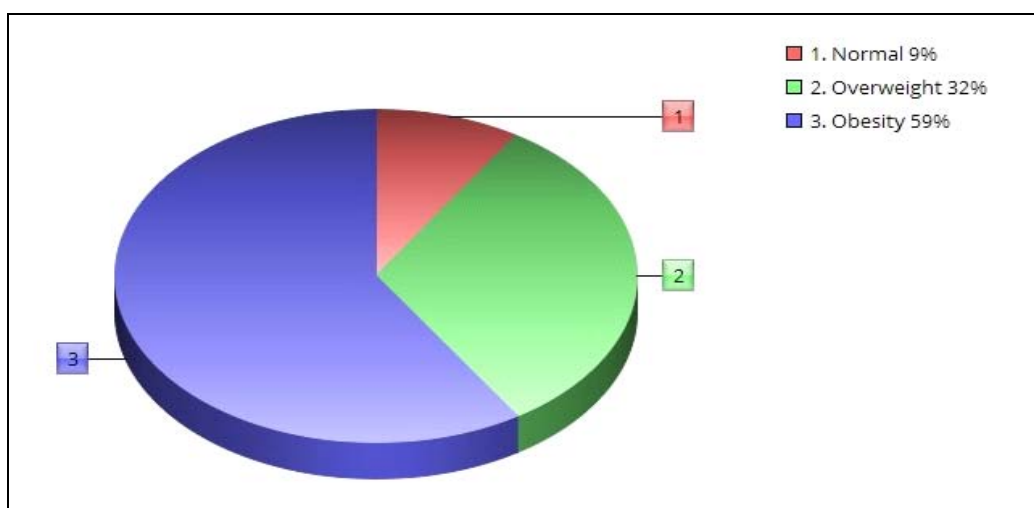


Figure 3: Distribution of BMI within patients without arm lymphedema

BMI:

BMI categories determined by the World Health Organization (WHO) {140}

Classification	BMI (kg/m²)
Underweight	<18.5
Normal	18.5–24.9
Overweight	25.00–29.99
Obese I	30.00–34.99
Obese II	35.00–39.99
Obese III	≥40.00

Figure 4: BMI categories determined by (WHO)

3. Diabetes :

About 36.4% (8 cases) were diabetic among patients with arm Lymphedema,

While only 14.8% (9 cases) were diabetic in patients without lymphedema, with a statistically significant difference $p= 0.034$

Tab III: Distribution of patients according to diabetes

Diabete	Lymphedema present		Lymphedema absent		P
	Number	Percentage%	Number	Percentage%	
Yes	8	36.4	9	14.8	0.03
No	14	63.7	52	85.2	
Total	22	100	61	100	

4. High blood pressure :

We observed only two cases 9.1% of high blood pressure in patients with arm lymphedema.

Tab IV:Distribution of patients according to high Blood pressure

HTA	Lymphedema present		Lymphedema absent	
	Number	Percentage%	Number	Percentage
YES	2	9.1	0	0
NO	20	90.9	61	100
TOTAL	22	100	61	100

5. Cardio vascular diseases :

None of patients 0% in our study had Cardio vascular diseases.

III. Breast cancer Characteristics:

1. Type :

The **invasive ductal carcinoma** was the most frequent type in this study in both categories, 72.7% among patients with arm lymphedema vs 86.9% of patients without arm lymphedema, followed by the invasive lobular carcinoma type respectively with 22.7% vs 8.2%.

The bivariate analysis wasn't applicable due to the large categorization and the small sample included in this study.

Tab. V : Distribution of patients according to histological type of tumor

Histological type	Lymphedema present		Lymphedema absent	
	Number	Percentage%	Number	Percentage%
Invasive Ductal carcinoma	16	72.7	53	86.9
Invasive Lobular carcinoma	5	22.7	5	8.2
Papillary carcinoma	0	0	2	3.3
Tubular carcinoma	1	4.6	0	0
Ductal carcinoma with predominant intraductal component	0	0	1	1.6
Total	22	100	61	100

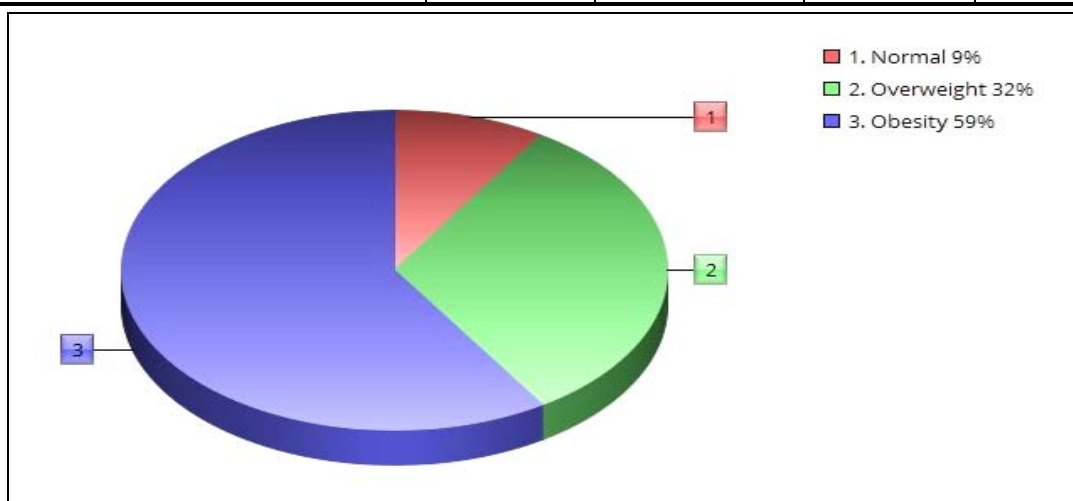


Figure 5: Distribution of patients according to histological type of tumor

2. Localisation of carcinoma :

2.1. Right/left:

The carcinoma occurred most often in right breast in both categories of patients, with no statically significant difference $p= 0.8$

Tab. VI : Distribution of patients according to the site of tumor

Site	Lymphedema present		Lymphedema absent		P
	Number	Percentage%	Number	Percentage	
Right	13	59	38	62	0.80
Left	9	41	23	38	
Total	22	100	61	100	

2.2. Quadrants :

Upper outer quadrant was the most frequent quadrant of the tumor in both categories, bivariate analysis was not applicable due to the small sample of this study compared to the categorization.

Tab. VII : Distribution of patients according to quadrant localization of tumor

Quadrant	Lymphedema present		Lymphedema absent	
	Number	Percentage%	Number	Percentage
UOQ	13	59.1	26	42.6
UIQ	2	9.1	11	18.0
LOQ	6	27.3	18	29.5
LIQ	1	4.5	6	9.9
Total	22	100	61	100

3. TNM Classification:

Among the patients with lymphedema T4, N0, and M0 are the most frequent whereas, T1/T2, N0 and M0 are the most represented among the patients without lymphedema the bivariate analysis can not be applied due to the small sample compared to the categorization, also it was limited due to the absence of the exact numbers of lymph nodes removed in the anatomic pathology reports of the patients

Tab. VIII : Distribution of patients according to TNM classification

TNM	Lymphedema present		Lymphedema absent	
	Number	Percentage%	Number	Percentage
T				
T1	6	27.3	17	27.8
T2	5	22.7	16	26.2
T3	1	4.5	13	21.4
T4	10	45.5	15	24.6
N				
N0	8	50	24	54.5
N1	5	31.2	12	27.3
N2	2	12.5	5	11.4
N3	1	6.3	3	6.8
M				
M0	22	100	61	100
M1	0	0	0	0

4. SBR grade:

During this study, more than 3 of 4 carcinoma (75%) was diagnosed in grade II in both categories of patients (tab.IX)

With a statistically insignificant difference $p=0.31$

Tab. IX : Distribution of SBR grade

Grade SBR	Lymphedema present		Lymphedema absent		P
	Number	Percentage%	Number	Percentage	
SBR I	1	4.5	3	5	0.31
SBR II	17	77.2	46	75.4	
SBR III	4	18.2	12	19.6	
Total	22	100	61	100	

IV. Breast Cancer treatment options:

The therapeutic tools were; surgery, chemotherapy, radiation therapy, hormone therapy and physiotherapy.

1. Surgery :

1.1. time to treatment initiation (TTI):

The mean of TTI (time between diagnosis and treatment initiation) among patients with arm lymphedema was 125 day with minimum and maximum were 45 and 449 days.

Whereas the mean of TTI of patients without lymphedema was 95 day. The shortest and longest duration were 31 and 320 days.

The long time between diagnosis and surgical response seems to be associated to risk of BCRL ($p= 0.023$).

Tab. X : Means of time to treatment initiation

	Lymphedema present	Lymphedema absent	P
<i>TTI (mean number of day)</i>	125.23	95.00	<u>0.023</u>

1.2. Type of surgery:

The Mastectomy with axillary lymph node dissection was the most surgery type practiced during our study in both categories of patients, with statically no significant difference $p=0.07$

All patients (N=83) had undergone axillary lymph nodes dissection.

None of patients had sentinel lymph node biopsy because this recent technique wasn't applicable yet in our department.

Tab. XI : Distribution of patients according to the type of surgery

Surgery	Lymphedema present		Lymphedema absent		p
	Number	Percentage%	Number	Percentage	
Mastectomy with lymph nodes dissection	17	77.3	35	57.4	0.07
Breast conservating with lymph nodes dissection	5	22.7	26	42.6	
Sentinel lymph node Biopsy	0	0	0	0	
Total	22	100	61	100	

2. Chemotherapy :

All patients with arm lymphedema 22 (100%) had chemotherapy, whereas 54 (88.5%) of patients without arm lymphedema underwent chemotherapy treatment. With statically no significant difference $p=0.10$

Tab. XII : Distribution of patients according to chemotherapy

Chemotherapy	Lymphedema present		Lymphedema absent		P
	Number	Percentage%	Number	Percentage%	
Yes	22	100	54	88.5	0.10
No	0	0	7	11.5	
Total	22	100	61	100	

- **Type of chemotherapy :**

More than 50% of patients with arm lymphedema had neoadjuvant chemotherapy vs 37% in patients without arm lymphedema

While 63% of patients without lymphedema had adjuvant chemotherapy vs 40.9 in patients with arm lymphedema

The type of chemotherapy wasn't statically significant according to bivariate analysis with $p=0.06$.

Tab. XIII : Distribution of patients according to the adjuvant/neoadjuvant chemotherapy

Type	Lymphedema present		Lymphedema absent		P
	Number	Percentage%	Number	Percentage%	
Adjuvant	9	40.9	34	63	0.06
Neoadjuvant	13	59.1	20	37	
Total	22	100	54	100	

- **Number of sessions of Chemotherapy :**

The mean number of CT sessions among patients with arm lymphedema was 7.36 session with minimum and maximum were 4 and 22 sessions

Wheres the mean of CT sessions in patients without lymphedema was 6.37 sessions with minimum and maximum were 4and 20 sessions

With no statically significant difference ($p= 0.08$)

Tab. XIV : Distribution of patients according to the number of chemotherapy session

	Lymphedema present	Lymphedema absent	P
Mean number of CT sessions	7.36	6.37	0.08

3. Radiation therapy :

77.3% of patients with arm lymphedema were radiated during this survey, while 55.7% of patients without arm lymphedema had undergone radiotherapy.

With a statically insignificant difference $p= 0.06$

Tab. XV : Distribution of patients according to Radiation therapy

RT	With lymphedema		Without lymphedema		P
	Number	Percentage%	Number	Percentage%	
Yes	17	77.3	34	55.7	0.06
No	5	22.7	27	44.3	
Total	22	100	61	100	

- Type of radiation therapy :

Most of patients 82% with arm lymphedema had undergone Regional lymph node radiation (RLNR) compared to 73.5% of patients without arm lymphedema who had RLNR

With no statically significant difference $p=0.37$

Tab. XVI : Distribution of patients according to the type of radiation therapy

RT type	With lymphedema		Without lymphedema		P
	Number	Percentage%	Number	Percentage%	
Axillary	14	82.4	25	73.5	0.37
Chest	3	17.6	9	26.5	
Total	17	100	34	100	

4. Hormone therapy :

Around 86.4% of patients with arm lymphedema received hormone therapy.

Almost the same for the second categorie, 82% of patients without arm lymphedema received Hormonotherapy.

With no statically significant difference $p = 0.45$

Tab XVII : Distribution of patients according to the hormone therapy HT

HT	Lymphedema present		Lymphedema absent		P
	Number	Percentage%	Number	Percentage%	
YES	19	86.4	50	82	0.45
NO	3	13.6	11	18	
Total	22	100	61	100	

- Type:

Tamoxifen was administered to 14 (73.6%) patients and letrozole to 5 (26.3%) patients with arm lymphedema

While tamoxifen was administrated to 41(82%) patients and letrozole to 9 (18%) patients without arm lymphedema.

There is no statically significant difference with $p= 0.31$

Tab XIIV : Distribution of patients according to the type of hormone therapy

Type HTH	Lymphedema present		Lymphedema absent		P
	Number	Percentage%	Number	Percentage%	
Tamoxifen	14	73.6	41	82	0.31
Letrozol	5	26.3	9	18	
Total	19	100	50	100	

- **Physiotherapy :**

Lymphedema occurred in 22 patients (26.5%), and Only **8 (36,4%)** patients who had physiotherapy during this study. The mean number of physiotherapy session was 8 ± 3 with 4 and 12 as extremes.

Tab. XIX : Distribution of patients with arm lymphedema according to physiotherapy

Physiotherapy	Patients with arm lymphedema	
	Number	Percentage%
Yes	8	36.4
No	14	63.6
Total	22	100

- **Evolution of physiotherapy :**

7 patients said that they noticed lymphedema improvement after physiotherapy.

- Bivariate analysis of risk factors of BCRL :

Tab. XX : Associated risk factors of BCRL according to bivariate analysis

Associated factors	Lymphedema n (%)		P value
	No	Yes	
Diabete n (%)			
Yes	9 (53.00)	8 (47.00)	<u>0.03</u>
No	51 (78.5)	14 (21.5)	
<i>BMI (mean)</i>	27.00	30.00	<u>0.04</u>
<i>TTI (mean number of day)</i>	95.00	125.23	<u>0.02</u>
Chemotherapy n (%)			
Yes	54(71%)	22(29%)	0.10
No	7(100%)	0(0%)	
Radiotherapy n(%)			
Axillary	40(70%)	17(30%)	0.37
breast	21(81%)	5(19%)	
Chemotherapy type n(%)			
Neoadjuvant	37(71%)	15(29%)	0.06
Adjuvant	17(71%)	7(29%)	
Age (mean)	50	48	0.42
Site (%)			
Right	38(74.5%)	13(25.5%)	0.80
Left	23(72%)	9(28%)	

V. Diagnosis of arm lymphedema:

1. Arm Lymphedema diagnosis:

Lymphedema was defined as being present when the volume of the ipsilateral arm was 200 cm³/ml or greater than that of the contralateral arm. (Tab n° XXI)

Most patients with arm lymphedema were in stage I of Arm lymphedema 17 (77.4%) with minimum and maximum of arm volume difference were 234 ml and 382.3 ml respectively. (tab n°XXII)

Tab. XXI : Volume difference in population study.

Volume difference	Number of patients N	%
>200 ml (Lymphedema present)	22	26.5
<200 ml (Lymphedema absent)	61	73.5
Total	83	100

Tab. XXII : Distribution of stages of arm lymphedema

Stage	severity	Difference in circumference and volume	Number of patients (N=22)	Percentage%
I	Mild	2-3cm (200-400 ml)	17	77.4
II	Moderate	3-5 cm (400-700 ml)	5	22.6
III	Severe	>5cm (>750 ml)	0	0



Figure 6 : Images of arm lymphedema of two of our patients demonstrating the edema in ipsilateral arm compared to the contralateral arm.

2. DASH score:

2.1. Daily activities:

Mild difficulty was observed in 16 items with different percentages ranging from 6% to 71% of patients with arm lymphedema, over 50% of them had mild difficulty in items (1,2,11,18.). Moderate difficulty was observed on 6 items, and severe difficulty for only 6% of patients in 3 items (1,11,12)(tab n° XXIII)

While only 7 to 10 % of patients without arm lymphedema have mild difficulty in 6 items of daily activities(1,7,11,14,18,19) the rest of items pose no difficulty for the patients.(tab n°XXIII)

Tab. XXIII : Distribution of Dash questionnaire answers about daily activities.

Difficulty: Question	Patients with arm lymphedema Total n = 22 patients					Patients without arm lymphedema Total n = 61 patients				
	No 1%	Mild 2%	Moderate 3%	Severe 4%	Unable 5%	No 1%	Mild 2%	Moderate 3%	Severe 4%	Unable 5%
1. Open a tight or new jar	5	71	18	6	0	93	7	0	0	0
2. Write.	30	55	9	6	0	100	0	0	0	0
3. Turn a key.	57	30	13	0	0	100	0	0	0	0

Evaluation of occurrence or arm lymphedema after breast cancer treatment

4. Prepare a meal.	94	6	0	0	0	100	0	0	0	0
5. Push open a heavy door.	94	6	0	0	0	100	0	0	0	0
6. Place an object on a shelf above your head.	100	0	0	0	0	100	0	0	0	0
7. Do heavy household chores (e.g., wash walls, wash floors).	62	38	0	0	0	90	10	0	0	0
8. Garden or do yard work.	100	0	0	0	0	100	0	0	0	0
9. Make a bed.	88	12	0	0	0	100	0	0	0	0
10. Carry a shopping bag or briefcase.	94	6	0	0	0	100	0	0	0	0
11. Carry a heavy object (over 10 lbs).	38	52	0	0	0	91	9	0	0	0
12. Change a lightbulb overhead.	94	6	0	0	0	100	0	0	0	0
13. Wash or blow dry your hair.	100	0	0	0	0	100	0	0	0	0
14. Wash your back.	88	12	0	0	0	92	8	0	0	0
15. Put on a pullover sweater.	94	6	0	0	0	100	0	0	0	0
16. Use a knife to cut food.	100	0	0	0	0	100	0	0	0	0
17. Recreational activities which	100	0	0	0	0	100	0	0	0	0

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require little effort (e.g., cardplaying, knitting, etc.).										
18. Recreational activities in which you take some force or impact through your arm, shoulder or hand (e.g.,golf, hammering, tennis, etc.)	12	64	0	0	0	92	8	0	0	0
19. Recreational activities in which you move your arm freely (e.g., playing frisbee, badminton, etc.).	39	42	0	0	0	92	8	0	0	0
20. Manage transportation needs (getting from one place to another).	66	34	0	0	0	100	0	0	0	0
21. Sexual activities.	100	0	0	0	0	100	0	0	0	0

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2.2. Last week activity :

Over 30% of patients with arm lymphedema had a slightly limitation about last week regular activities and 12% of them had moderately limitation.

While only 7% of patients without arm lymphedema had a slightly limitation during last week activities. (Tab n° XXIV)

Tab XXIV : Distribution of Dash questionnaire answers about last week activitie (22–23).

Difficulty: Question	Patients with arm lymphedema Total = 22 patients					Patients without lymphedema Total = 61 patients				
	No 1%	slightly 2%	Moderately 3%	Quite a bit 4%	extremely 5%	Not at all 1%	slightly 2%	Moderately 3%	Quite a bit 4%	Extremely 5%
22 During the past week, to what extent has your arm, shoulder or hand problem interfered with your normal social activities with family, friends, neighbours or groups?	56	32	12			100	0	0	0	0

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limitation: Question	Patients with arm lymphedema Total = 22 patients					Patients without lymphedema Total = 61 patients				
	Not at all 1%	Slightly 2%	Moderately 3%	Very limited 4%	Unable 5%	No 1%	Slightly 2%	Moderately 3%	Very limited 4%	Unable 5%
23 During the past week, were you limited in your work or other regular daily activities as a result of your arm, shoulder or hand problem?	35	59	6	0	0	93	7	0	0	0

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2.3. Symptoms and pain:

70% of them have arm pain, only 6% of patients have severe arm pain.

Whereas, all patients noticed weakness of arm with 87% Mild weakness and 13% for moderate weakness,

All patients noticed stiffness in their arm with 67% Mild stiffness and 33% for moderate stiffness.

Tab XXV : Distribution of Dash questionnaire answers about symptoms and pain (24–28)

Question	Patients with arm lymphedema Total = 22 patients					Patients without lymphedema Total = 61 patients				
	None 1%	Mild 2%	Moderate 3%	Severe 4%	extrem 5%	None 1%	Mild 2%	Moderate 3%	Severe 4%	extreme 5%
24. Arm, shoulder or hand pain.	5	71	18	6	0	93	7	0	0	0
25. Arm, shoulder or hand pain when you performed any specific activity.	8	62	14	6	0	93	7	0	0	0
26. Tingling (pins and needles) in your arm, shoulder or hand.	57	30	13	0	0	96	4	0	0	0
27. Weakness in your arm, shoulder or hand.	0	87	13	0	0	88	12	0	0	0
28. Stiffness in your arm, shoulder or hand.	0	67	37	0	0	100	0	0	0	0

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2.4. Psychological and sleeping problems

41% of patients with arm lymphedema have mild difficulty in sleeping because of the arm pain, 4.5 %had severe difficulty, and 4.5% can't sleep. 4

48% agree that's they fell less capable and less confident because of the arm lymphedema.

While only 7% of patients without arm lymphedema have mild difficulty in spleeling andonly 8% Agree to feel less capable and less confident because of the arm lymphedema.

Tab XXVI: Distribution of Dash questionnaire answers about psychological and sleeping problems(29–30).

Difficulty: Question	Patients with arm lymphedema Total = 22 patients					Patients without lymphedema Total = 61 patients				
	No 1%	Mild 2%	Moderate 3%	Severe 4%	So much, I can't sleep 5,%	No 1%	Mild 2%	Moderate 3%	Severe 4%	So much, i can't sleep 5,%
29. During the past week, how much difficulty have you had sleeping because of the pain in your arm, shoulder or hand?	32	40	18	5	5	93	7	0	0	

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Question	Patients with arm lymphedema Total = 22 patients					Patients without lymphedema Total = 61 patients				
	Strongly disagree 1%	Disagree 2%	Neither agree nor disagree 3,%	Agree 4%	Strongly Agree 5%	Strongly disagree 1%	Disagree 2%	Neither agree nor disagree 3,%	Agree 4%	Strongly Agree 5%
30. I feel less capable, less confident or less useful because of my arm, shoulder or hand problem.	0	5	30	48	17	0	82	10	8	0

3. Interpretation of DASH scores:

- A Dash Score of 0 represent no disability
- A Dash Score of 100 represent most severe disability

Most of patients with arm lymphedema have a mild disability with a score between 10–19 followed by patients with dash score of 20–29, the minimum and maximum scores were 12.5% and 41.7% respectively

Whereas over 50% of patients without arm lymphedema have a minimal disability with a score between 1–9 followed by patients who have no disability with dash score of 0, where minimum and maximum scores were 0% and 10.8%. respectively.

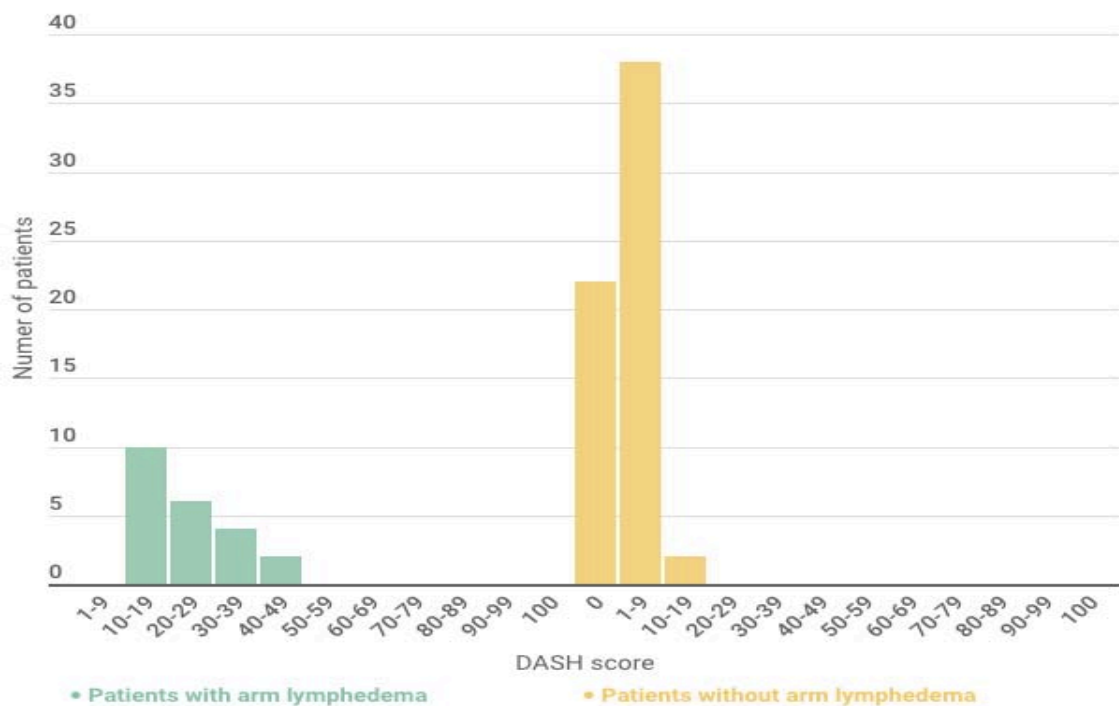


Figure7 : Score distribution of The DASH among patients with and without lymphedema.

DISCUSSION

I. General overview of Breast Cancer :

- Epidemiological aspects:

Breast cancer (BC) is a leading health concern among women due to its high mortality and morbidity rate. The five-year survival rate in metastatic breast cancer is less than 30% [108]. Recent GLOBOCAN (2020) data produced by the IARC (International Agency for Research on Cancer) from 185 countries reported 2 261 419 new cases (11.7% of total new cases of all cancers) of breast cancer with a mortality rate of 6.9% of total death due to all cancers (684 996 death) [109]. Breast cancer incidence is more common in high-income countries (571/100 000) than in low-income counties (95/10 000).

In Morocco, the BC new cases in 2020 are estimated at 11 747 and 3 695 deaths [113].

The risk of developing cancer before the age of 75 years reach 15.3% and 9.1% of chance to dye from cancer before the age of 75 years [113].

In the region of Marrakech-safi, Through a retrospective study in 2020 spread over 10 years from January 1, 2007 to December 31, 2017 on all women treated for breast cancer in the obstetric gynecology service of the CHU MOHAMED VI in Marrakech, 1790 cases of breast cancer were identified [130].

Side effects of treatment

Breast cancer treatments can cause both temporary side effects that stop soon after treatment finishes and longer-term side effects.

Chemotherapy side effects [127,128]

- Blood clots
- Hair loss
- Nausea and vomiting
- Extreme tiredness
- Numbness and tingling in hands and feet

- Sore mouth
- Pain at the injection site
- Menopausal symptoms

Hormonotherapy [127,128]

The most common side effects of hormone therapy are menopausal symptoms such as:

- Hot flushes
- Night sweats
- Vaginal dryness
- Reduced sex drive
- Mood changes

Side effects of surgery [127,128]

- Fatigue
- Shoulder stiffness
- Numbness and tingling
- Seroma
- Lymphoedema
- Side effects of radiotherapy [127,128]
- Swelling of the breast
- Pain in the breast or chest area
- Hair loss in the armpit
- Sore throat
- Extreme tiredness
- Lymphoedema

II. General overview of lymphedema :

1. Pathophysiology of lymphedema:

The Edema can be considered as a palpable swelling resulted from the increase of fluid in the interstitium, due to an imbalance between capillary filtration and lymph drainage no matter the underlying cause.

The edema comes from of either imbalance between the hydrostatic and colloid osmotic pressure over the membrane of the capillary or insufficient absorption by the lymphatic system. [18]

- The capillary hydraulic pressure change during [18];
 - Heart failure,
 - Nephritic syndrome,
 - Venous obstruction
 - Drug-induced,
- The capillary permeability can swap because [18];
 - Trauma
 - Damaged lymph vessel
 - Inflammation or sepsis
 - Allergic reactions
 - Acute respiratory distress syndrome
 - Diabetes mellitus
- The interstitial colloid osmotic pressure can augment due to hypothyroidism of malignant ascites.

The reduction in the plasma colloid pressure occurs during hypo-albuminaemia can lead to edema. *Edema can also be provoked by lymphatic obstruction due to nodal enlargement due to malignancy, lymph node removal) or lymphatic insufficiency due to leaking valves. So, the fluid that is normally filtered by the lymphatic system is not returned to the systemic circulation. This case of interstitial fluid retention is lymphedema. [18]

It usually occurs when lymphatic outflow has been reduced by 80% or more.

The interstitial protein concentrations raise significantly engendering the accumulation of additional water due to osmotic pressure. The accumulation of interstitial fluid leads to massive dilatation of the remaining lymphatic outflow and valvular incompetence that causes reversal of flow from subcutaneous tissues into the dermal plexus. [18]

In a later stage, the lymphatic walls undergo fibrosis, and fibrinoid thrombi accumulate within the lumen, obstructing the remaining lymph channels and spontaneous lympho-venous shunts may be created. Lymph nodes harden and shrink, losing their normal architecture. In this advanced stage of the disease, protein and fluid concentration in the interstitium may initiate an inflammatory reaction. Macrophage activity is increased, conducting the destruction of elastic fibres and production of fibrosclerotic tissue. Fibroblasts move into the interstitium and deposit collagen resulting in irreversible damage. This situation end up by the deleting of local immunologic surveillance, and chronic infections, as well as malignant degeneration to lymphangiosarcoma, may occur. [18]

We may distinguish [18–26];

Primary lymphedema (PL): The PL is an abnormality or dysfunction of the lymphatic system as;

- Insufficient number of lymphatic capillaries,
- Lymphatic hypoplasia or hyperplasia
- Functional insufficiency or absence of lymphatic valves.

The PL is idiopathic of nature and considered congenital.

Primary lymphedema is often associated with genetic diseases like mutations of the FLT4 gene in Milroy disease and of the FOXC2 gene in distichiasis. PL is found in both sexes, but women are more often affected than men.

Secondary lymphedema (SL): The SL results from disruption or obstruction of a normal lymphatic system due to disease or iatrogenic processes.

The dominant cause of SL is infection with *Wuchereria bancrofti* (WB) resulting in a disease called filariasis. The WB is a nematode worm that enter in the human body through a mosquitoes vector and get the bloodstream after which it migrates to the peripheral lymphatic system causing obstruction.

In the western world nearly all cases of SL are related to malignancy or its therapy. It seems like, oncological treatment disturb the drainage by damaging the lymphatic system.

Most of SL is associated with breast cancer treatment

III. Discussion of results:

1. Incidence:

Given the variation of criteria used to define lymphedema and the variety of assessment methods, we have wide variation in the reported incidence of lymphedema following breast cancer treatment. Lymphedema rates of 6% to 70% among patients with breast cancer have been described. [18,39,40]

In our research the incidence was 26.5%, more than the ones of the studies lead by Rupp et al and Pereira et al [39,100] who reported respectively 13.5 and 20.7%. Our incidence was in the range of the Harris et al research who stated that lymphedema rates of 6% to 70% among patients with breast cancer [40]. But, the percentage of patients who developed arm lymphedema during the study of Chae Weon et al and Shahpar were higher with 59% and 30% [101,102]

Tab. XXVII : Incidence of BCRL in different studies

Study	Year	Measurment tools	Incidence
H. Ben Salah, Tunisie	2012	≤ 40 ans	23%
Yuki Hara, Japan	2022	Arm Circumference >2cm	20%
Kwan	2002	Diff Volume of arm > 200mL	17.5%
Bland	2003	Objective messurments	43.3%
Park et al, south korea	2008	Arm circumference >2cm	25%
Sandra C, AUSTALIA	2008	Objective measurements	30%
<u>Tessa C. Gillespie</u> , USA	2019	objective measurements,	21.4%
Our survey	2022-2023	Arm circumference/ volume And volume >200ml	26.5%

Follow up time : Ozcinar et al [29] indicated a BCRL of 18% after median follow-up of 64 months), while Bevilacqua et al [16] reported a 5 year cumulative BCRL rate of 30.3% after a median follow-up of 41 months. Armer et al [28] found a BCRL rate of 35 and 43% after 24 months and 60 months, respectively.

In our study. The incidence of BCRL was around 26.5% after a median follow up time of 48 months.

2. Non-treatment-related risk factors for BCRL:

2.1. Age :

the means age of patients included in the studies of Pereira et al (55±13 years) and Haen et al (61.3 ± 9.9 years) [18,39]. But, the mean age of our participants was older than the participants mean age of the study carried out by Shahpar et al (49 ±0.9) [102]. The patients mean age of our study was close to the one of Chung et al (52.5±9.1 years) [9].

In the research of Gunel gulyeva et al.[8] who included twenty-six studies which were published between 1974 and 2020 involving 19 396 patients with BCRL, 26 studies were included in the final analysis, and 13 articles reported no association between age and BCRL development.[8]

Same in our study, the age of patients wasn't significantly incriminated with BCRL development.
(p=0,42)

2.2. Body mass index:

The mean of the body mass index was in the study reported by Haen was ($29.4 \pm 5.67 \text{ kg/m}^2$). The body mass index mean of the patients ($24.52 \pm 3.54 \text{ kg/m}^2$) in the study conducted by Lee et al. which was lower than the BMI in our study 30 kg/m^2 .

In a prospective cohort screening for BCRL, Jammallo and colleagues found a BMI greater than or equal to 30 kg/m^2 was an independent risk factor for BCRL (10). This result was similar to Ridner and colleagues' smaller prospective study in which they found that patients with a BMI of 30 kg/m^2 or above were 3.6 times more likely to develop lymphedema,(10), also the study of DiSipio et al. Higher Bmi was found to have a strong level of evidence as an independent risk factor for BCRL development (11)

The research work conducted by Johansson found that also the higher BMI was associated with the development of arm lymphedema following breast cancer treatment

Similar to our study where we found that Highter BMI seemed to be associated with BCRL according to bivariate analysis (**p=0.04**) see tab

2.3. Comorbidities:

Comorbidities such as diabetes hypertension, or cardiovascular diseases as risk factors of BCRL were minimal.

In our study, we found out that the diabetes increase significantly the risk to develop the lymphedema **p= 0.03**

While high blood pressure and cardiovascular diseases weren't applicable due to the small number of cases.

2.4. Type of tumor :

The invasives ductal carcinoma and lobular carcinoma were the most observed during our study like the studies conducted by Hassan and QABA. While most of cancer was diagnosed in grade II in our study (76%) and the one lead by Hassan (80%), but the cancer was diagnosed more often at grade III in study carried out by Pereira [12].

Also the Study conducted by ben salah found that Infiltrating ductal carcinoma was the most frequent histological type (80% of cases), with predominant SBR II grade (62%)

The type of tumor in literature wasn't associated to risk factors of BCRL, in our study it was not applicable in bivariate analysis due to the large categorization of types compared to the small sample.

3. Treatment related risk factors for BCRL:

The main treatment-related risk factors for BCRL literature include axillary lymph node dissection (ALND) and regional lymph node radiation (RLNR). There is strong evidence that both ALND and RLNR are independent risk factors for BCRL. Additionally, emerging evidence indicates lack of breast reconstruction as another treatment-related risk factor. Conversely, discord exists in the literature regarding risk posed by **chemotherapy**

3.1. Axillary lymph node dissection (ALND):

In a meta-analysis, DiSipio et al. analysed 72 studies and found, 9 studies, including at least two prospective cohort studies and two randomized clinical trials, provided strong evidence that ALND is a risk factor for BCRL, in the study of Kilbreath et al. 18.2% of patients with ≥ 5 axillary LNs removed developed BCRL compared to 3.3% of patients with < 5 nodes removed,

Tsai et al. found that ALND increases BCRL risk threefold compared to no axillary dissection. However, a recent meta-analysis of BCRL incidence in patients with unilateral breast cancer estimated that patients who receive ALND have a lymphedema incidence four times higher than those who receive sentinel lymph node biopsy (SLNB) [19.9% vs 5.6% respectively] (11).

These results are supported by Kilbreath and colleagues, who prospectively screened for lymphedema and found similar incidence rates when they stratified their data by number of nodes removed. For patients who have had more than five or more nodes removed, the incidence rate was 18.2%; for patients with less than five nodes removed, the incidence rate was 3.3% (13). This suggests that BCRL risk associated with axillary surgery may depend on the number of nodes removed, a metric that is generally accepted as an approximation for overall surgical damage to the lymphatic system (14).

Indeed, Kim and colleagues showed that BCRL incidence rates in patients with 10 or more axillary lymph nodes removed were significantly greater than in patients with less than 10 dissected lymph nodes (27% *vs.* 6% respectively), and McLaughlin and colleagues found a significant difference in the number of axillary lymph nodes removed for patients who did not develop BCRL compared to those that did (19 *vs.* 22 respectively) (14,15).

In our study All patients had surgery with axillary lymph node dissection (ALND), and 26.5% of them had developed BCRL, but it was not applicable in bivariate analysis. This is a result of the absence of patients who did not get ALND in our study to be compared with ALND group, and the lack of information in the anatomic pathology report about numbers of lymph nodes removed

3.2. Adjuvant and neoadjuvant chemotherapy:

Some studies indicate **adjuvant** chemotherapy as a potential risk factor for BCRL whereas other studies do not.

The Adjuvant chemotherapy was a significant risk factor for the appearance of lymphedema according the study of Rupp et al about frequency and risk factors for arm lymphedema after multimodal breast conserving treatment [16].

In a recent prospective cohort study by Kilbreath and colleagues, arm swelling at 6 and 12 months was associated with **adjuvant Chemotherapy**, and swelling at both time points were independent risk factors for LE development (13).

Zhu et al recent retrospective analysis 2017 lends support to Kilbreath et al.'s findings. They found that **adjuvant** chemotherapy significantly increased the risk of breast cancer-related lymphedema (P=0.01) (17).

The recent study of Amanda W. Jung on march 2023 concluded that The receipt of **adjuvant** chemotherapy and specifically adjuvant taxane-based chemotherapy **were not associated** with increased risk of BCRL

The effect of **neoadjuvant** chemotherapy on BCRL risk is unclear. In a retrospective study of Kim et al. **Neoadjuvant** CT was not found to be a significant risk factor associated with BCRL (P=0.61) ;

Specht et al. in a prospective cohort leads to that The comparison between patients undergoing **neoadjuvant** CT and patients undergoing **adjuvant** CT was not statistically significant, with incidence rates of 23% and 15% respectively (HR: 0.76; P=0.39) And For neoadjuvant CT patients, BCRL risk increased ninefold when there was residual lymph node disease post-CT (P=0.038)

In our survey The comparison between patients undergoing neoadjuvant CT and patients undergoing adjuvant CT was not statistically significant (P=0.06)

Neoadjuvant chemotherapy is utilized in breast cancer treatment to decrease the size of the primary tumor and any affected lymph nodes, allowing for less extensive surgery. It has been suggested that neoadjuvant chemotherapy could, in theory, decrease BCRL incidence by reducing the number of positive lymph nodes (131,132) More studies, using objective and standardized BCRL measurement techniques and definitions, are needed to define the role of neoadjuvant and adjuvant chemotherapy in BCRL risk.

3.3. Radiation therapy:

In many studies Radiotherapy to the regional nodes, or RLNR, has been shown to be a significant risk factor for lymphedema development,

Warren and colleagues demonstrated that RLNR, increase significantly BCRL risk compared to breast/chest wall RT alone

Another recent study of **Kamonrat et al.** found that patients undergoing regional lymph node irradiation, and no arm and shoulder exercises after treatment had a higher risk of arm lymphedema.

A prospective cohort of **Miller et al.** found that 19.3% of unilateral or bilateral breast mastectomy patients who received ALND without RT developed BCRL compared to 30.1% of unilateral or bilateral mastectomy patients who received ALND with Radiotherapy

a Meta-analysis conducted by Tsai et al. including 98 studies published in and before 2008 concluded that Radiotherapy has a risk ratio of 1.92 compared to no Radiotherapy.

In our survey, Despite the fact that patients who received RLNR had a higher BCRL risk compared with those who received chest/breast radiation (30% v 5%, respectively), this difference was not significant on bivariate analysis (P= 0.37)

Thus, patients undergoing RLNR, even without ALND, should be considered a high-risk group for developing Arm lymphedema, and all patients undergoing ALND and/or RLNR should be prospectively screened.

3.4. Hormone therapy

Tamoxifen treatment leads to lymphatic dysfunction and aggravates lymphedema. Tamoxifen inhibits estrogen binding to its receptor ER α on lymphatic endothelial cells to block both genomic and non-genomic pathways. After long-term delivery, the blockade of ER α by hormone therapy leads to lymphatic dilatation and leakage, the main features of lymphatic shape in lymphedema.

The study by Morfisse et al. established the crucial role of female hormone, in particular E2, on the lymphatic endothelium. They found that the development of lymphedema, a lymphatic dysfunction in breast cancer survivors, is not only a side effect of surgery, but is highly dependent of the hormonal status. This study shows that women develop more lymphedema after hormone therapy, in particular tamoxifen, the major hormone therapy used for pre-menopausal women.

In our study type of hormone therapy is not associated to risk factors of BCRL

IV. Diagnosis of breast cancer related lymphedema:

Actually we don't have any objective measurement method to assess BCRL. Currently most studies use relative subjective methods, such as Clinical examination in combination with circumference measurements and self-report.

The methods such as MRI, CT, ultrasound and limb volume measurements (perometry and the water displacement method) are more accurate, but often expensive, time consuming, which makes them relatively unsuitable for daily clinical practice.

Bio-impedance spectrometry and the assessment of tissue dielectric constant are new promising diagnostic tools are. [18]

1. Self-Report (SR) :

A high percentage of women treated for breast cancer suffer from complaints such as perception of increased size, pain, heaviness, skin alterations or feelings of discomfort in the arm and breast with reduction of life quality. These sensations are clearly related to BCRL, but not ideal tool to assess quantitatively the level of lymphedema in the arm or breast. [18]

The SR is a questionnaire based tool, so the outcome is highly dependent on the questionnaire used, how the questions are presented and language skills of the patient. [18]

There are several validated questionnaires that are also commonly used to assess BCRL [18,41,42];

The 'Functional Assessment of Cancer Therapy Breast (FACT-B+ 4) is one of the most commonly used Likert- type point scale questionnaires. However, the FACT-B+ 4 often overestimating lymphedema comparing to objective assessment methods.

Elsewhere, the 6-item Functional Assessment of Cancer therapy-Breast Symptom Index (FBSI) is similar and highly correlated with the FACT-B + 4. [18,41,42]

We do have also [18,43];

The 'Lymphedema and Breast Cancer Questionnaire' (LBCQ-Part I) is developed and revised by Armer et al and contain 19 questions that assess signs and symptoms of limb volume changes.

The questionnaire developed by Norman et al based upon a patient's own interpretation of arm swelling that differentiates 'mild' from 'severe' lymphedema.

The relationship between these surveys and more objective assessment methods has not been adequately investigated.

We have also the questionnaire of DASH (Disabilities of the Arm, Shoulder and Hand) [105,106]: It's an upper-extremity specific outcome measure tool introduced by the American Academy of Orthopedic Surgeons in collaboration with a number of other organizations. One of the main concepts behind developing the DASH was to facilitate comparisons among different upper-extremity conditions in terms of health burden. The DASH outcome measure is a 30 item patient self-report questionnaire. The DASH is designed to quantify disability and symptom experience of patient with upper extremity musculoskeletal disorders. It integrates also question on social and emotional function beside the physical function.

In our study, Most of patients with arm lymphedema 64% have minimal disability, 27% have moderate disability and only 9% of them have severe disability.

Whereas All the patients without arm lymphedema has minimal disability with minimum and maximum were 0% and 8.3%.

2. Circumference and volume measurements :

2.1. Volume measurements (VM):

VM is an objective way to diagnose lymphedema.

We can compare the arm volume to the contralateral arm most common because temporal fluctuations in BMI do not affect the outcome.

For a reliable assessment, multiple measurements over a period of time are necessary since BCRL is a dynamic process, particularly in the early stages of the disease [18,45];

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- The arm volume can be estimated indirectly from multiple circumference measurement
- We can also use more accurate methods such as:
 - Water displacement
 - Perometry.

2.2. Circumference measurements :

are taken bilaterally at ten sites along the arm at 4cm intervals, the first site is placed at 19cm from the base of the nail of the third finger.

In research where diagnosis is based upon circumference the patient is often considered lymphedema positive when [44,45,46,48,49,50,51,52,53]; There's an increase Of 2.0cm of the affected arm over the contralateral arm,

The increase of the affected arm over the contralateral arm can be also expressed in percentage.

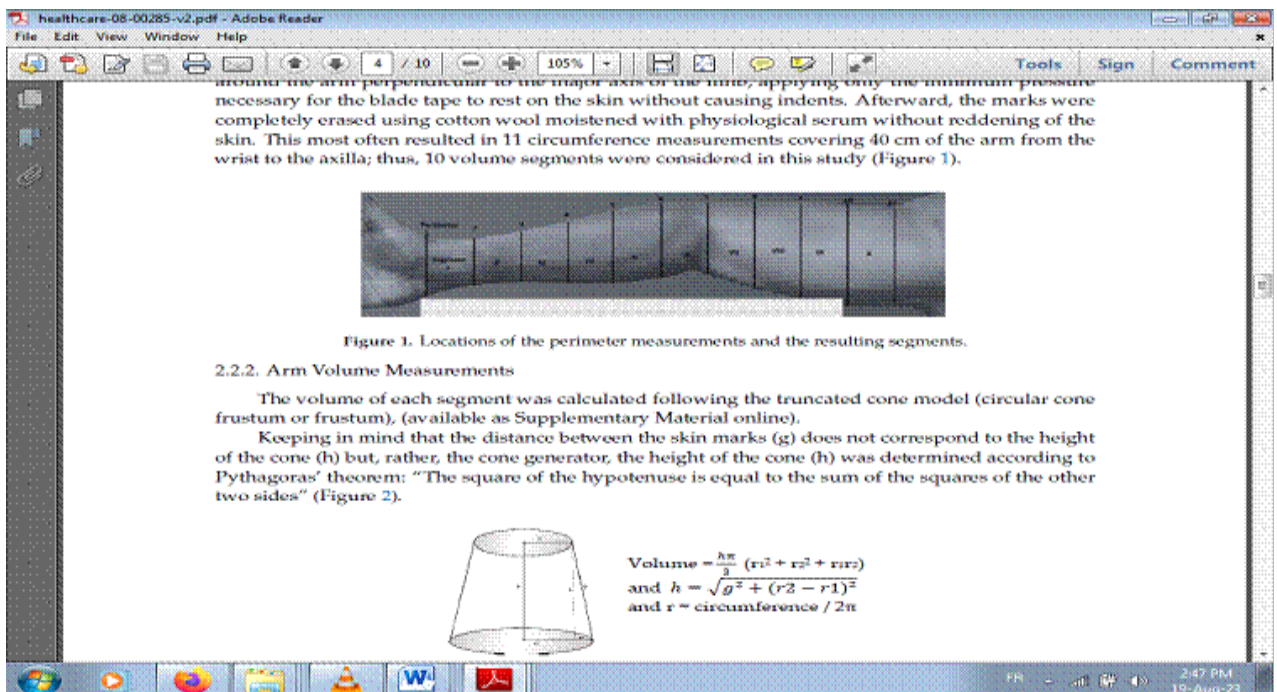


Figure 8 : Locations of the perimeter measurements and the resulting segments [65].

2.3. The water displacement (WD):

WD can be used to realize more accurate assessment of the total arm volume. He is often considered as the golden standard [47,53,54,55,56,57];

The patient submerges her arm in a cylinder filled with water and the overflow of fluid is collected and measured. The WD cannot be used in clinical settings because it's cumbersome. Furthermore, this procedure is not applicable in patients with BCRL associated wounds or skin lesions.

2.4. Optoelectronic perometry (OP) :

OP is Another way to determine arm volume.

It operates in movable frame positioned at 90 degrees above a horizontal base plate. This frame has rows of infrared light emitters on two sides at right angles to each other, which project light toward rows of light sensors on opposite sides. The limb is placed in the measuring frame, it blocks the transmission of light creating a shadow. Given the measuring frame is moved along the longitudinal axis of the limb, vertical and horizontal limb diameters are recorded every 5 mm and the total volume is calculated. [47,54, 55,56],

The affected arm lymphedema can be regarded positive when [47,53,54,55,56,57];

- There's 200ml difference with the contralateral arm or a 200ml difference with the preoperative measurement,
- There's an increase of 20% compared to the control arm or 10% compared to preoperative assessments.



Figure 9: Assessment of the total arm volume by water displacement

In Johansson et al study, the mean preoperative volumes on the operated and non-operated sides were 2312 ml and 2310 ml, respectively higher than the mean arm volume (1795 ml) recorded by Tánori–Tapia et al [65].

In our study, the mean and median arm volumes difference were 163 and 116 ml. The extremes were 28 and 524 ml. The mean and median score of DASH (Disabilities of the Arm, Shoulder and Hand) were 5 and 2. The extremes were 0 and 29.

3. Ultrasound:

Ultrasonography has an established diagnostic tool in many medical specialties. Safety, high patient tolerability and relatively low cost are the principle advantages. The traditional ultrasound devices like the widely available 7.5– and 10–MHz transducers (adequate for the examination of subcutaneous tissues) may not be accurate enough to explore the skin.

It's known that dermal echogenicity is inversely proportional to its concentration in water. So Lymphedema can be considered as a loss of echogenicity of the skin in high–resolution cutaneous ultrasonography.

In normal skin, the dermis is echogenic and the subcutis has a hypoechogenic basal structure with diffuse hyper-echoic branches related to the connective tissue separating adipose lobules. In lymphedematous skin uniform homogenous hypo-echoic appearances are seen in the dermis when compared with the unaffected skin. The lymphedema can be confirmed by homogeneous dermal hypo-echogenicity.

In patients diagnosed with lymphedema the dermal and subcutis thickness is often greater in the affected arm compared with the unaffected arm.

More research needs to be conducted before ultrasound can be implemented in the routine of breast cancer related lymphedema assessment. [18,58-60]

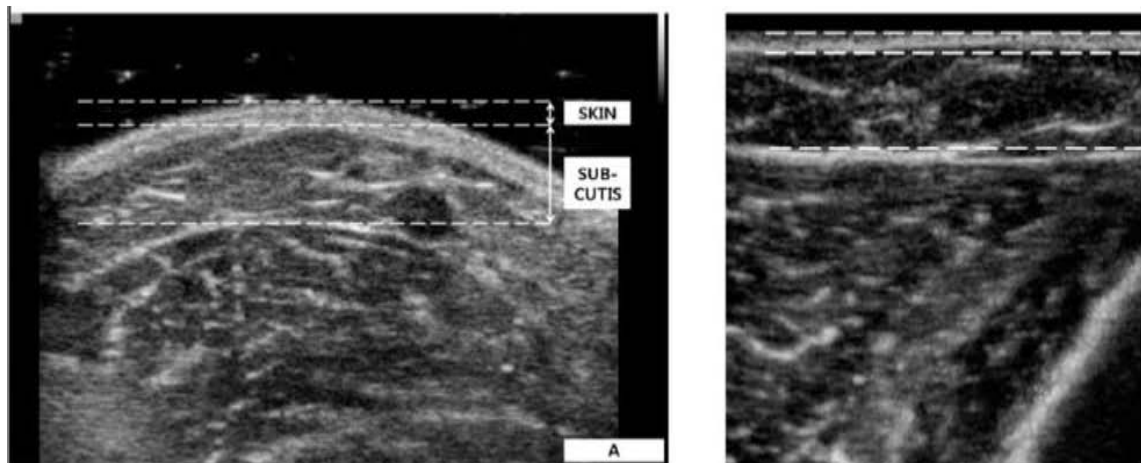


Figure 10: Ultrasonography images of the arm of a patient with lymphedema demonstrating the thickness of the skin, subcutaneous tissue, and their sum with minimal compression (A) and with maximal compression (B).[67]

4. Magnetic resonance imaging (MRI) :

Magnetic resonance imaging but MRI can be a helpful tool to evaluate lymphedema even he is not used routinely.

The MRI gives more details about, the lymphatic system including possible pathologic dermal lymphatic vessels as well as more proximal lymph nodes without the use of radiation or added contrast product. Elsewhere, the high sensitivity of MRI allows confirming the diagnosis of lymphedema. Skin thickening and a ‘honeycomb’ structure due to fibrosis in the subcutaneous tissue are the Classical signs of lymphedema on MRI [18,61].

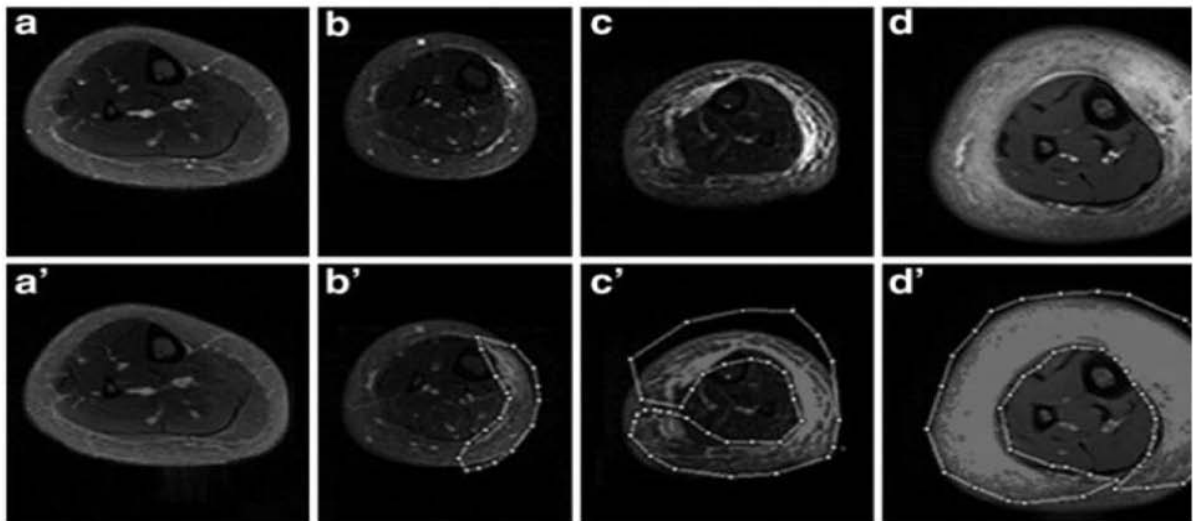


Figure 11: Fat-suppressed mid-axial T2W images of calves showed the changes of subcutaneous tissue areas with LEL identified as stage 0 in the right calves in a 27-year-old man (a), stage 1 in the right calf in a 19-year-old woman (b), stage 2 in the right calf in a 38-year-old woman (c), stage 3 in the right calf and in the left calf in an 11-year-old girl (d). The images of a', b', c', and d' are corresponding to the images of a, b, c, and d, respectively, for measurement. The swelling part of the calf was circled by the point curve, the edema images were grey level, and the water appeared grey. The Image software can measure the area of the grey part within the point curve. LEL, lower extremity lymphedema. [68]

5. Computed Tomography (CT):

The sensitive and specific of CT imaging in confirming the diagnosis of lymphedema reach 97 and 100%. But it does not have the detailed imaging ability available with other methods. A significant increase in subcutaneous tissues can be showed on cross-sectional analysis of lymphedema patients even the densities do not correlate with lymphedema. So, CT can only assess lymphedema when the disease has resulted in a significant volume increase of the limb. Furthermore, patients are exposed to a relative high dose of radioactive radiation and CT doesn't provide any advantage over MRI, therefore it is only recommended when MRI or lymphoscintigraphy is unavailable. [18,62–64].

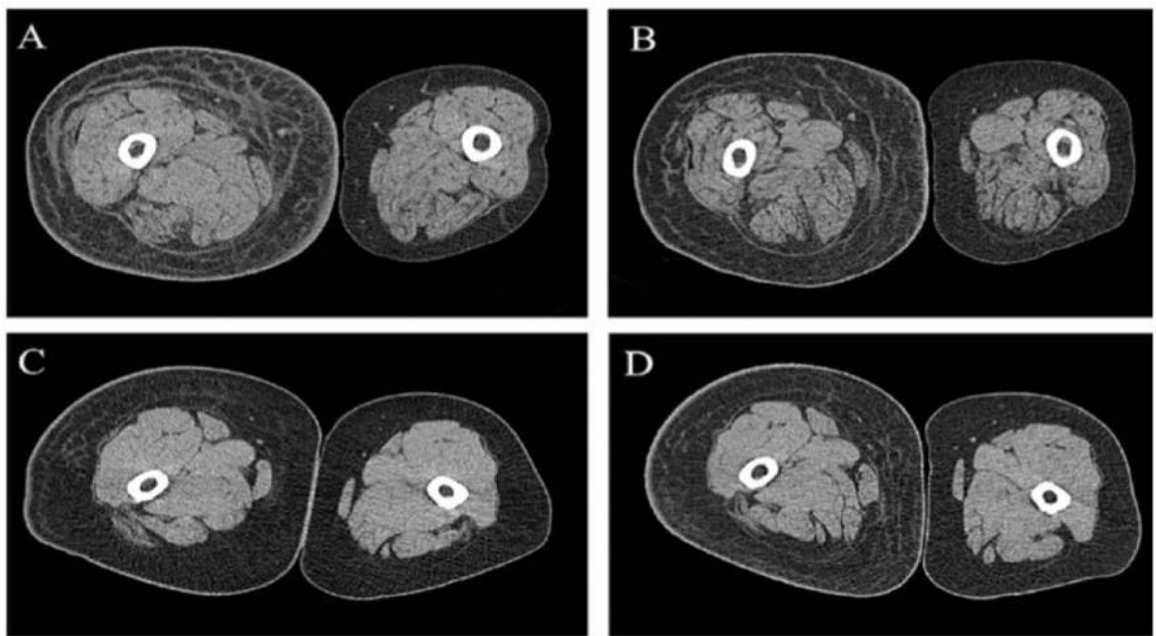


Figure 12: Bidirectional change of subcutaneous fibrosis in computed tomography (CT) scan. Fibrosis was improved in follow-up (B) than initial (A). Fibrosis was aggravated in follow-up (D) than initial (C).

[69]

V. Management of lymphedema:

Before any type of lymphedema treatment, tumor involvement of the axilla or brachial plexus, infection and axillary vein thrombosis should be looked for and treated if present. [18,40]

The disease has many treatment options that have demonstrable efficacy for the reduction of edema volume and the prevention of fluid accumulation. Early recognition of lymphedema related symptoms are essential in the treatment of lymphedema. So an assessment method that can identify early changes in tissue water content associated with lymphedema would be of great value [18,40]. The main objectives of non-operative therapy options are; reducing the swelling, recovery of the function of the extremity and improving the quality of life of the patient. They can manage the symptoms for a period of time, but take away very rarely the lymphedema. [18,40]

A side from physical manifestations, lymphedema can also seriously affect the psychosocial function of the patient. The education and counseling during the treatment must not be underestimated. The management is a multidisciplinary approach more often. [18,40]

1. Compression therapy [18,40]:

The compression therapy aims to decrease the interstitial fluid production and tries to transport the excessive lymph fluid to the main circulation. The spectrum of external compression consists of elastic sleeves, stretch compression bandages and pneumatic compression devices. Elastic sleeves can be split into 'daytime' and 'nighttime' sleeves. Both can be ordered in standard sizes. Depending on the severity of the lymphedema, sleeves divided into four classes with a pressure of 20 mmHg to 60 mmHg can be fitted.

Collins and colleagues, assess by CT scanning the effect of compression garment therapy in 27 women with unilateral lymphedema. They found significant decreases in the cross-sectional area of subcutaneous compartments (the mean decrease was 9% in the proximal portion and 26% in the distal portion of the limb). One of the few randomized controlled trials of lymphedema, the use of a compression sleeve plus electrically stimulated lymphatic drainage was compared with the use of a compression sleeve alone. Both modalities decreased limb girth by 17%.



Figure 13: Patient with compression bandages [70].

2. Manual Lymph Drainage therapy (MLD) [18,40]:

It's a complex physical therapy often added to the compression therapy, designed to improve lymphatic drainage.

The first phase includes manual lymphatic drainage, sometimes in combination with exercise together with meticulous skin care prior to compressive garments.

The second phase often consists of maintenance treatment at home; self-massaging, massage treatment from relatives and wearing compression sleeves.

MLD is a massage technique that assumes to contract and drain fluid away from congested regions.

MLD is a collective title for many different techniques, but is most of time it's about to describe the Dr. Vodder technique; the skin stretched and torqued in a specific manner with constant change in pressure, moving away the interstitial fluid and reducing fibrotic induration.

MLD is normally carried out on a daily basis for 1 to 6 weeks with working from proximal to the distal end of the affected extremity.

The effective result of MLD seems to depend on the lymphedema assessment method, treatment duration and the treatment objectives. There are some consensuses about the fact that MLD is an effective treatment method for patients with established lymphedema of an extremity and success rates vary significantly. In a large study including 149 patients with upper-extremity lymphedema; a significant reduction of almost 70% was measured by circumferential volume assessment directly after the MLD treatment in 131 patients. A decrease of approximately 55% in volume of the affected arm after 18 months of in 82% of patients who initially benefitted MLD treatment. The reduction of lymphedema directly after MLD treatment is supported by others.

3. Physiotherapy, exercise and elevation [18,71]:

Many physiotherapists believe that dynamic exercises associated with MLD can decrease the volume of a lymphedema affected limb. The hypothesis is that the activation of the muscles surrounding the lymph vessels will stimulate the flow along the valved lymphatic system and even improve protein resorption. Secondly, dynamic training avers to prevent soft tissue contractures, which can obliterate lymph flow.

The drop in intrathoracic pressure by deep inspiration followed by expiration also contributes to improved lymph clearance.

However, research reported small decreases in limb volume; in a study investigating 10 minute arm exercise in combination with a deep breathing regime a decrease of 5.8% and 9% in total limb volume was found after respectively 1 week and 1 month after the debut of the exercise. Patients claimed to experience significant improvements in perceived limb size and heaviness as well as improved functional movement. Despite the minimal volume decreasing, many patients report improvements in range of movement of the arm, perceived limb volume, heaviness and tightness.

In our study 36.4% of our patients benefited the physiotherapy during this study whereas 55% of patients included in the study of Bordea et al benefited physiotherapy [129].

4. Pharmaceutical therapy:

In addition to compression and drainage therapies, pharmacologic agents that have the abilities to break down the protein accumulation in the interstitium have been investigated;

The benzopyrones like coumarin derivates (5,6-benzo-[a]-pyrone) acts on lymphedema by limiting the fluid filtration rate rather. Benzopyrones are claimed to [18,72-78];

- Control proteolysis by increasing the protease activity of cutaneous macrophages, which catabolize the protein with reduction of extracellular tissue water content.

Evaluation of occurrence or arm lymphedema after breast cancer treatment

- Diminish the vascular permeability lowering the capillary filtration and diminishes outflow of proteins and fluid.
- Have a positive effect on the immune system by increasing the t-helper/t-suppressor ratio, suppressing the production of superoxide and hydrogen peroxide in by monocytes, thereby enhancing protein reabsorption. There is no enough data to draw any conclusions on volume reduction and secondary outcomes such as improvement of quality of life or pain reduction by benzopyrones.

Nevertheless, some randomized placebo-controlled crossover studies found a slow and significant reduction of lymphedema, but others did not support their beneficial effect.

In addition, there is a lack of long term follow up studies and the reports about possibility of hepatotoxic effect cause a concern.

It's believed also, flavonoids, such as Diosmin, Hesperidin, Ruscus Aculeatus or the combination drugs Cyclo-Fort have [18,79-82];

- A small therapeutic benefit in the treatment of lymphedema.
- Protective effects on vascular endothelium and improve the microcirculation by decreasing the number of macromolecules leaking from the blood vessels.

However there is a lack of large randomized controlled trials with to confirm this belief. So, these drugs don't have a role in the common treatment of lymphedema.

5. Surgical treatment:

The surgical treatment of lymphedema is reserved for patients where conservative treatments don't work.

The surgical procedures can be categorized in two major groups [18]:

Debulking [83–86]: debulking procedures reduce size or weight to enhance mobility and function of the affected limb by removing the excess of lymphedematous skin and subcutaneous tissue. In first place, debulking surgery is an aggressive approach in which all of the soft tissue with the overlying skin on top of the deep fascia was removed and the newly created surface was covered by skin grafts. Secondly, the procedure was modified and musculo–cutaneous flaps were used to cover the defect. The debulking is claimed to be beneficial in the severe lymphedema treatment, the true efficacy of surgical debulking remains unknown because the difficulties to compare due to different patient selection, surgical approach, and outcome. Unfortunately, Debulking procedures don't address directly the dysfunction of the lymphatic system and the underlying pathology remains, so the lymphedema may return.

The invasive surgical debulking procedures should be reserved for patients with unacceptable subcutaneous adipose hypertrophy and fibrosis that is seriously compromising the quality of life. Especially since surgical debulking can be accompanied by serious complications including the potential obliteration of the remainder of the cutaneous lymphatic system.

The surgical debulking can be accompanied by serious complications;

- The potential obliteration of the remainder of the cutaneous lymphatic system.
- Sensory loss of the skin, necrosis of the skin or graft, skin ulceration and keratosis, infections, deep vein thrombosis and hypertrophic scars.
- Depending upon the extent of the procedure, the patient can be left with a significantly deformed limb with the risk of psychological problems and a diminished quality of life.

Surgical liposuction of lymphedematous tissues: it has been considered to be more effective than conventional surgical debulking procedures with a less risk of complications. The published percentages of limb volume reduction after 12 months differ from 18% to 118% [87–89]. This wide range of success depends on [87–89];

- Surgical technique,
- Patient selection
- Postoperative compression treatment modality. Among the complications of liposuction of lymphedema erysipelas is the most frequent.

The microsurgical reconstruction (MCR): The MCR aim to return the lymphatic flow to normal or bypass the obstruction in the lymphatic system. This can be achieved by creating lymphatic vessel-venous ('lymphaticovenous') shunts or autologous vessel transplantation in various confirmations between vessels of 0.3 - 0.8 mm. These shunts are constructed by lymphaticovenous anastomosis with or without an intravascular stent [90–96]. Only patients with functional lymphatics distal of the obstruction are eligible for these microsurgical procedures [97].

In a retrospective 5-year follow up of 665 patients lead by Campisi et al, reported the lymphatic bypass procedure success in 83% of all patients with a permanent mean volume reduction of 67% supported by Baumeister et al [97,98].

VI. Strengths and limits :

This research work is one of the first studies to be focused on one of the most prevalent consequences from the treatment of breast cancer. The results from this study can help the health care workers and decision makers to get some overviews of the lymphoedema linked to the breast cancer management and potentially adjust materials or humans resources. The data derived from this survey can be the starting point of others research on breast cancer management side effects like lymphoedema. However, the fact this study is conducted in only one center during short period and variety of measurement method push us to be careful about the generalization of the data from the results of this survey.

RECOMMENDATIONS

This study highlights the need for strategies to prevent lymphedema. In addition, it reinforces the importance of early diagnosis of breast cancer, so that less aggressive treatment strategies can be possible aiming to improve the quality of life.

Healthy life style should be promoted through all information means.

Enhance public information, health education on screening (self-examination, mammography) and treatment of breast cancer. In fact, health education of patients regarding early diagnosis, presuming that low stage disease treatment involves a decreased risk of arm lymphedema.

Health education of patients on skin care to avoid breast infections. Although, Improvement the skills and capacity of health work force must be considered.

After the operation, the guidance of doctors or health education teachers about exercises to prevent tissue contracture and sclerosis shoulder should be available and accessible

We need more data or research works on alternative screening modalities that may increase adherence or be more effective. Further development of chemoprevention trials with lower doses or better side effect profiles to increase adherence. Additional research is needed regarding survivorship to improve quality of life.

Access and equity in cancer care should be improved to address existing disparities through advocacy and policy with decision or policy makers.

CONCLUSION

This study was one of the first studies to highlight the occurring risk of Breast cancer related lymphedema, as also as some factors associated with it in this survey. In fact this research estimated cumulative incidence of BCRL roughly at 27% and found that the diabetes increase significantly the risk to develop BCRL. whereas lower body mass index and shorter surgical response time were significantly associated with lower risk of arm lymphedema. Given the lack of data to grab all the reality about the subject the results from this study can help the future research. Finally this work suggests enhancing public information, health education on life style, screening (particularly self-examination and mammography), promote research works on alternatives, and improve Access and equity reducing disparities through advocacy and policy with decision or policy makers.

ANNEX

Annex 1: the questionnaire used in our research.

Evaluation of occurrence of arm lymphedema after breast cancer traitement

Questionnaire :

Full name / IP				Age :		
Diagnosis	Date :	Type of Cancer :	Stage of TNM :	SBR grade :		
	Site :					
Surgery	Date :	Mastectomy	<input type="checkbox"/>	Axillary Lymph node dissection :	Yes <input type="checkbox"/>	No <input type="checkbox"/>
		Patey	<input type="checkbox"/>	Lymph nodes removed: N		
		Breast conserving surgery	<input type="checkbox"/>	Positive nodes:		
Chemotherapy	Neoadjuvant	<input type="checkbox"/>	When:	How much : cycles		
	Adjuvant	<input type="checkbox"/>	When:	How much : cycles		
Radiation therapy	Axillary	<input type="checkbox"/>	When:	How much:		
	breast	<input type="checkbox"/>	When:	How much:		
Hormones therapy	YES	<input type="checkbox"/>	Type:	Duration :		
	NO	<input type="checkbox"/>				
Kinesitherapy	YES	<input type="checkbox"/>	Date :	Sessions :		
	NO	<input type="checkbox"/>				
Other Risk factors	Obesity	High blood pressure		Diabetes		Cardiovascular diseases
	BMI(kg/m2) :	Yes <input type="checkbox"/>	Yes <input type="checkbox"/>	Yes <input type="checkbox"/>	Yes <input type="checkbox"/>	
		No <input type="checkbox"/>	No <input type="checkbox"/>	No <input type="checkbox"/>	No <input type="checkbox"/>	

DISABILITIES OF THE ARM, SHOULDER AND HAND

Please rate your ability to do the following activities in the last week by circling the number below the appropriate response.

	NO DIFFICULTY	MILD DIFFICULTY	MODERATE DIFFICULTY	SEVERE DIFFICULTY	UNABLE
1. Open a tight or new jar.	1	2	3	4	5
2. Write.	1	2	3	4	5
3. Turn a key.	1	2	3	4	5
4. Prepare a meal.	1	2	3	4	5
5. Push open a heavy door.	1	2	3	4	5
6. Place an object on a shelf above your head.	1	2	3	4	5
7. Do heavy household chores (e.g., wash walls, wash floors).	1	2	3	4	5
8. Garden or do yard work.	1	2	3	4	5
9. Make a bed.	1	2	3	4	5
10. Carry a shopping bag or briefcase.	1	2	3	4	5
11. Carry a heavy object (over 10 lbs).	1	2	3	4	5
12. Change a lightbulb overhead.	1	2	3	4	5
13. Wash or blow dry your hair.	1	2	3	4	5
14. Wash your back.	1	2	3	4	5
15. Put on a pullover sweater.	1	2	3	4	5
16. Use a knife to cut food.	1	2	3	4	5
17. Recreational activities which require little effort (e.g., cardplaying, knitting, etc.).	1	2	3	4	5
18. Recreational activities in which you take some force or impact through your arm, shoulder or hand (e.g., golf, hammering, tennis, etc.).	1	2	3	4	5
19. Recreational activities in which you move your arm freely (e.g., playing frisbee, badminton, etc.).	1	2	3	4	5
20. Manage transportation needs (getting from one place to another).	1	2	3	4	5
21. Sexual activities.	1	2	3	4	5

DISABILITIES OF THE ARM, SHOULDER AND HAND

	NOT AT ALL	SLIGHTLY	MODERATELY	QUITE A BIT	EXTREMELY
22. During the past week, to <i>what extent</i> has your arm, shoulder or hand problem interfered with your normal social activities with family, friends, neighbours or groups? <i>(circle number)</i>	1	2	3	4	5

	NOT LIMITED AT ALL	SLIGHTLY LIMITED	MODERATELY LIMITED	VERY LIMITED	UNABLE
23. During the past week, were you limited in your work or other regular daily activities as a result of your arm, shoulder or hand problem? <i>(circle number)</i>	1	2	3	4	5

Please rate the severity of the following symptoms in the last week. *(circle number)*

	NONE	MILD	MODERATE	SEVERE	EXTREME
24. Arm, shoulder or hand pain.	1	2	3	4	5
25. Arm, shoulder or hand pain when you performed any specific activity.	1	2	3	4	5
26. Tingling (pins and needles) in your arm, shoulder or hand.	1	2	3	4	5
27. Weakness in your arm, shoulder or hand.	1	2	3	4	5
28. Stiffness in your arm, shoulder or hand.	1	2	3	4	5

	NO DIFFICULTY	MILD DIFFICULTY	MODERATE DIFFICULTY	SEVERE DIFFICULTY	SO MUCH DIFFICULTY THAT I CAN'T SLEEP
29. During the past week, how much difficulty have you had sleeping because of the pain in your arm, shoulder or hand? <i>(circle number)</i>	1	2	3	4	5

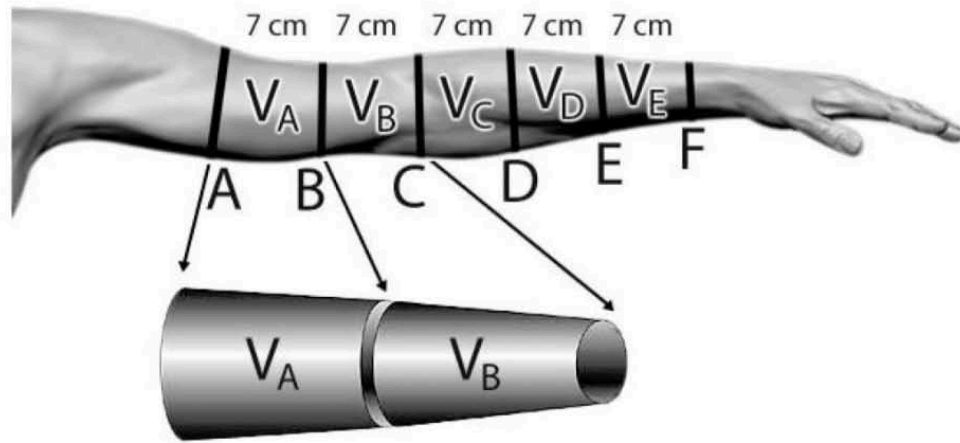
	STRONGLY DISAGREE	DISAGREE	NEITHER AGREE NOR DISAGREE	AGREE	STRONGLY AGREE
30. I feel less capable, less confident or less useful because of my arm, shoulder or hand problem. <i>(circle number)</i>	1	2	3	4	5

DASH DISABILITY/SYMPTOM SCORE = _____ ([(sum of n responses / n) - 1] x 25, where n is the number of completed responses.)

A DASH score may not be calculated if there are greater than 3 missing items.

CLINICAL EXAMINATION :

Mesure of arm circumferences and Volume:



$$V_{Limb} = V_A + V_B + V_C + V_D + V_E$$

	Right Arm (cm)	Left Arm (cm)
Point A		
Point B		
Point C		
Point D		
Point E		
Point F		
Volume (cm3)		
Difference volume between both arms (cm3) Cm3	

1cm3 = 1 ml

Annex 2: The Arabic version of DASH score.

1 إعاقات الذراع والكتف واليد

تعليمات

تستفسر هذه السلسلة من الأسئلة عن الحالات / الأعراض التي تحس بها في ذراعك، أو كتفك، أو يدك وعن مقدرتك على تأدية نشاطات معينة. الرجاء أن تجيب على كل سؤال، بناءً على حالتك خلال الأسبوع الماضي، و ذلك بوضع دائرة حول الرقم المناسب. إذا لم تسنح لك الفرصة لتأدية نشاط ما خلال الأسبوع الماضي، فالرجاء أن تقدر بأفضل ما تستطيع لتختار الجواب الأقرب إلى الدقة. عند إجابتك على الأسئلة، ليس مهماً أي يد أو ذراع تستخدم لتمارس نشاطك سواء كانت اليد المصابة أو السليمة.

الرجاء أن تجيب بناءً على مقدرتك بغض النظر عن الطريقة التي تؤدي بها العمل.



2

إعاقات الذراع والكتف واليد

الرجاء أن تقيّم قدرتك على فعل النشاطات التالية خلال الأسبوع الماضي، و ذلك بوضع دائرة حول الرقم الذي يقع تحت الجواب المناسب.

غير قادر	بصعوبة شديدة	بصعوبة متوسطة	بصعوبة خفيفة	بلا صعوبة	
5	4	3	2	1	1. أن تفتح علبة جديدة أو مُحكّمة الإغلاق.
5	4	3	2	1	2. أن تكتب.
5	4	3	2	1	3. أن تدير/ تدبر مفتاحا (مثل أن تدير مفتاح السيارة لتشغيلها).
5	4	3	2	1	4. أن تُحضّر/ تعد وجبة طعام .
5	4	3	2	1	5. أن تدفع لتفتح باباً ثقيلًا.
5	4	3	2	1	6. أن تضع شيئاً ما على رف فوق مستوى رأسك.
5	4	3	2	1	7. أن تقوم بأعمال المنزل الثقيلة (مثل غسل الحيطان أو إزاحة الأثاث أو سواها من الأشياء الثقيلة).
5	4	3	2	1	8. أن تعمل في الحديقة أو في فناء الدار.
5	4	3	2	1	9. أن ترتب السرير.
5	4	3	2	1	10. أن تحمل كيس التسوق أو حقيبة الوثائق.
5	4	3	2	1	11. أن تحمل غرضاً ثقيلًا (يزيد وزنه عن عشرة أرطال، أو أربعة كيلوغرامات و نصف).
5	4	3	2	1	12. أن تغيّر لمبة المصباح من فوق رأسك.
5	4	3	2	1	13. أن تغسل شعرك أو تنشفه بالمجفف الهوائي.
	4	3	2	1	14. أن تغسل ظهرك.
5	4	3	2	1	15. أن تلبس كنز/ثوب/بلوزة (سترة ذات أكمام طويلة).
5	4	3	2	1	16. أن تستخدم سكيناً لتقطيع الطعام.
5	4	3	2	1	17. أن تقوم بنشاطات ترفيهية تتطلب جهداً خفيفاً (مثل لعب الشطرنج أو سواها من الألعاب الأخرى).
5	4	3	2	1	18. أن تقوم بنشاطات ترفيهية تبذل فيها بعض القوة أو الدفع عبر ذراعك أو كتفك أو يدك (مثل لعب التنس أو سواها من الألعاب الأخرى).
5	4	3	2	1	19. أن تقوم بنشاطات ترفيهية تحرك فيها ذراعك بحرية (مثل لعب رمي القرص أو الفريسيبي أو سواها من ألعاب مماثلة).
5	4	3	2	1	20. أن تنتقل بالمواصلات من مكان لآخر (أن تنتقل بمساعدة أعضاء جسدك العلوية كالإمساك بمقود السيارة).
5	4	3	2	1	21. النشاطات الجنسية. (الإجابة على هذا السؤال اختياري)

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Arabic translation courtesy of Naser Mohammed Alotaibi, School of Occupational Therapy, Texas Woman's University, TX, USA / School of Occupational Therapy, Kuwait University, Kuwait.

3

إعاقات الذراع والكتف واليد

لا أبداً على الإطلاق	بشكل طفيف	بشكل متوسط	بشكل كثيراً	بشكل بالغ للغاية
1	2	3	4	5

22. خلال الأسبوع الماضي، هل أثرت المشكلة في ذراعك أو كتفك أو يدك بنشاطاتك الاجتماعية العادية مع عائلتك، أو أصدقائك، أو جيرانك، أو زملائك بالمهنة/النادي الاجتماعي؟ (ضع دائرة حول الرقم المناسب)

غير محدود على الإطلاق	محدود بشكل طفيف	محدود بشكل متوسط	محدود جداً	غير قادر
1	2	3	4	5

23. خلال الأسبوع الماضي، هل أثرت المشكلة في ذراعك أو كتفك أو يدك بنشاط عملك أو أي نشاطات يومية اعتيادية أخرى؟ (ضع دائرة حول الرقم المناسب)

الرجاء تقدير شدة العوارض التالية التي أحسست بها خلال الأسبوع الماضي (ضع دائرة حول الرقم المناسب).

لا يوجد	قليلاً	بشكل متوسط	بشدة	بشدة بالغة للغاية
1	2	3	4	5

24. وجع/الم/عوارض في الذراع، أو الكتف، أو اليد.

25. وجع/الم/عوارض في الذراع، أو الكتف، أو اليد حينما أديت أي نشاط معين.

26. وخز (مثل وخز الدبابيس و الإبر) في ذراعك، أو كتفك، أو يدك.

27. ضعف في ذراعك، أو كتفك، أو يدك.

28. تيبس/تصلب في ذراعك، أو كتفك، أو يدك.

لا صعوبة	صعوبة خفيفة	صعوبة متوسطة	صعوبة شديدة	صعوبة بالغة الشدة بحيث لا أقدر على النوم
1	2	3	4	5

29. خلال الأسبوع الماضي، كم كانت صعوبة نومك بسبب الوجع/الم/عوارض في ذراعك، أو كتفك، أو يدك؟ (ضع دائرة حول الرقم المناسب)

لا أوافق بشدة	لا أوافق	لست موافقاً ولا مُعترضاً	أوافق	أوافق بشدة
1	2	3	4	5

30. أشعر بأنني أقل ثقةً بنفسِي وذلك بسبب مشكلة ذراعي، أو كتفي، أو يدي (ضع دائرة حول الرقم المناسب).

إعاقات الذراع والكتف واليد: إجمالي درجات الإعاقات / الأعراض = (مجموع عدد الإجابات) - 1 × 25 ، حيث (العدد) يساوي عدد الإجابات المكتملة.

لا يمكن حساب إجمالي الدرجات في مقياس إعاقات الذراع والكتف واليد إذا تجاوز عدد البنود الناقصة ثلاثة بنود.

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Arabic translation courtesy of Naser Mohammed Alotaibi, School of Occupational Therapy, Texas Woman's University, TX, USA / School of Occupational Therapy, Kuwait University, Kuwait.

ABSTRACT

Abstract

Introduction

breast cancer represents a serious public health problem.

Breast cancer related lymphedema is a chronic and recurrent condition involving the lymphatic and blood systems

The objective of this thesis is to determine, within our survey, the Incidence of breast cancer Related lymphedema as well as to a study the different Risk factors relating to the occurrence of arm lymphedema,

Materials and methods

We conducted a cross sectional study carried out over a period of two years from January 1, 2018 to December 31, 2019 covering all women treated for breast cancer in the obstetrics and gynecology department of University Hospital center MOHAMED VI in Marrakesh.

Data collection was carried out based on medical files of the department's archives, and a questionnaire completed by patients at the moment of clinical examination.

The questionnaire we developed for this research is validated by the department of physiotherapy and reeducation of chu med 6

It is divided into three parts

1 / information about Breast cancer history and treatment

2 / evaluation the quality of life and the function of the arm with DASH score.

3 / measurement tools to define arm lymphedema presence: circumference and volume.

Results:

The incidence of BCRL is 26.5% (22/83 patients), after a median follow up of 48 months. 64% of them have minimal disability according to the Dash score; 36% of patients with lymphedema had rehabilitation. However, improvement of lymphedema was observed by patient in 7 cases. Parameters predicting lymphedema were studied. Significant risk factors were Higher BMI, Diabetes and the long Time to treatment initiation between diagnosis of BC and treatment, The type of surgery, ALND, RLNR, CT did not predict lymphedema.

Conclusion:

The development of arm lymphedema is an unpredictable occurrence that can happen years after axillary surgery. Findings from this study can help health professionals in educating breast cancer survivor's about Lymphedema risk factors, as well as early detection and management of it by use of circumferential arm measurements to evaluate limb evolution during follow-up care.

Resumé

Introduction:

Le cancer du sein représente un grave problème de santé publique, Le lymphœdème lié au cancer du sein est une maladie chronique et récurrente touchant les systèmes lymphatique et sanguin.

L'objectif de cette thèse est de déterminer, dans le cadre de notre enquête, l'incidence du lymphœdème lié au cancer du sein ainsi que d'étudier les différents facteurs de risque liés à la survenue du lymphœdème du bras.

Matériels et méthodes:

Nous avons mené une étude transversale réalisée sur une période de deux ans allant du 1er janvier 2018 au 31 décembre 2019 couvrant l'ensemble des femmes traitées pour un cancer du sein au service de gynécologie et obstétrique du centre hospitalier universitaire MOHAMED VI de Marrakech.

La collecte des données a été réalisée à partir des dossiers médicaux des archives du service et un questionnaire complété par les patients inclus au moment de l'examen clinique.

Le questionnaire que nous avons élaboré pour cette recherche est validé par le service de médecine physique et rééducation du centre hospitalier universitaire Mohamed VI de marrakech, et il est divisé en trois parties

1 / informations sur les antécédents et le traitement du cancer du sein.

2 / évaluation de la qualité de vie et de la fonction du bras avec le score de DASH.

3 / outils de mesure pour définir la présence d'un lymphœdème du bras : circonférence et volume.

Résultats :

L'incidence du lymphœdème associé au cancer du sein est de 26,5% (22/83 patients), après un suivi médian de 48 mois. 64% d'entre eux ont un handicap minime selon le score de Dash ; 36% des patientes atteintes du lymphœdème ont bénéficiées d'une rééducation. Cependant, une amélioration du lymphœdème a été observée par 7 patientes. Les paramètres prédictifs du lymphœdème ont été étudiés. Les facteurs de risque significatifs étaient un IMC plus élevé, le diabète et le long délai avant le début du traitement (entre le diagnostic du cancer du sein et le traitement). Le type de chirurgie, le curage ganglionnaire axillaire, l'irradiation ganglionnaire axillaire, la chimiothérapie ne permettait pas de prédire le lymphœdème.

Conclusion:

Le développement du lymphœdème du bras est un phénomène imprévisible qui peut survenir des années après une chirurgie axillaire. Les résultats de cette étude peuvent aider les professionnels de la santé à informer les survivantes du cancer du sein sur les facteurs de risque du lymphœdème, ainsi qu'à le détecter et à le gérer précocement grâce à l'utilisation de mesures circonférentielles du bras. pour évaluer l'évolution des membres au cours les soins de suivi.

ملخص

مقدمة:

يمثل سرطان الثدي مشكلة صحية عامة خطيرة، فالوذمة اللمفية المرتبطة بسرطان الثدي هي مرض مزمن ومنتكس يؤثر على الجهاز اللمفاوي والدم.

الهدف من هذه الأطروحة هو تحديد، كجزء من تحقيقاتها، حدوث الوذمة اللمفية المرتبطة بسرطان الثدي وكذلك دراسة عوامل الخطر المختلفة المرتبطة بحدوث الوذمة اللمفية في الذراع.

المواد والأساليب:

أجرينا دراسة مقطعية أجريت على مدى عامين من 1 يناير 2018 إلى 31 ديسمبر 2019، وشملت جميع النساء اللاتي عولجن من سرطان الثدي في قسم أمراض النساء والتوليد بالمركز الاستشفائي الجامعي محمد السادس في مراكش.

تم جمع البيانات من الملفات الطبية الموجودة في أرشيف القسم ومن الاستبيان الذي تم استكماله من قبل المرضى المشمولين في وقت الفحص السريري.

الاستبيان الذي قمنا بإعداده لهذا البحث مصادق عليه من قبل قسم الطب الطبيعي وإعادة التأهيل بالمركز الاستشفائي الجامعي محمد السادس بمراكش، وهو مقسم إلى ثلاثة أجزاء.

1/معلومات عن تاريخ وعلاج سرطان الثدي.

2/تقييم جودة الحياة ووظيفة الذراع باستخدام مقياس DASH.

3/ أدوات القياس لتحديد وجود الوذمة اللمفية في الذراع: المحيط والحجم.

نتائج :

تبلغ نسبة حدوث الوذمة اللمفية المرتبطة بسرطان الثدي 26.5% (83/22 مريضة)، بعد متابعة متوسطة تبلغ 48 شهرًا. 64% منهم لديهم إعاقة بسيطة بحسب مقياس داش؛ استفاد 36% من مرضى الوذمة اللمفية من إعادة التأهيل. ومع ذلك، لوحظ تحسن في الوذمة اللمفية من قبل 7 مرضى. تمت دراسة المعلمات التنبؤية للوذمة اللمفية. كانت عوامل الخطر المهمة هي ارتفاع مؤشر كتلة الجسم والسكري والوقت الطويل لبدء العلاج (بين تشخيص سرطان الثدي وعلاجه). نوع الجراحة، تشريح العقدة الليمفاوية الإبطية، تشيع العقدة الليمفاوية الإبطية، العلاج الكيميائي لم يتنبأ بالوذمة اللمفية.

خاتمة:

يعد تطور الوذمة اللمفية في الذراع ظاهرة غير متوقعة يمكن أن تحدث بعد سنوات من جراحة الإبط. يمكن لنتائج هذه الدراسة أن تساعد المتخصصين في الرعاية الصحية على تثقيف الناجيات من سرطان الثدي حول عوامل خطر الوذمة اللمفية، بالإضافة إلى اكتشافها وإدارتها مبكرًا من خلال استخدام القياسات المحيطة للذراع. لتقييم تطور الأطراف أثناء رعاية المتابعة.

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قسم الطبيب

أقسم بالله العظيم

أن أراقب الله في مهنتي.

وأن أصون حياة الإنسان في كافة أطوارها في كل الظروف
والأحوال باذلة وسعي في إنقاذها من الهلاك والمرض

و الألم والقلق.

وأن أحفظ للناس كرامتهم، وأستر عورتهم، و أكتم

سِرَّهُمْ.

وأن أكون على الدوام من وسائل رحمة الله، باذلة رعايتي الطبية للقريب والبعيد، للصالح

والطالح، والصديق والعدو.

وأن أثابر على طلب العلم، وأسخره لنفع الإنسان لا لأذاه.

وأن أوقر من علمني، وأعلم من يصغرنى، وأكون أختا لكل زميل في المهنة الطبية متعاونين

على البر والتقوى.

وأن تكون حياتي مصداق إيماني في سري وعلانيتي، نقيّة مما يشينها تجاه

الله ورسوله والمؤمنين.

والله على ما أقول شهيد



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أستاذة في طب أمراض النساء والتوليد

ي. عبد الفتاح

السيد

أستاذ في الطب الفيزيائي والتأهيل

ع. العمراني

السيد

أستاذ في العلاج الإشعاعي

الحكام