International Journal of Advanced Community Medicine

E-ISSN: 2616-3594
P-ISSN: 2616-3586
IJACM 2018; 1(3): 11-15
Received: 27-07-2018
Accepted: 28-08-2018

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Prevalence of post mastectomy pain syndrome and its impact on quality of life of breast cancer survival in Sri Lanka

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Abstract
The breast cancer is the commonest carcinoma among females in Sri Lanka and majority of them are offered mastectomy. However, mastectomy itself cause many complications including Post Mastectomy Pain Syndrome which detriment the Quality of Life. This study gives an account of the prevalence Post Mastectomy Pain Syndrome of and its' impact on Quality of Life in Sri Lanka. Perceived pain and severity of pain were assessed with numerical pain scale. The WHO-QOL-BREF questionnaire was used to assess Quality of Life. The mean age of the sample was 54.5 years (SD=9.9) and majority of them (65.5 %) were above 50 years. The prevalence of Post Mastectomy Pain Syndrome was 27.5% (95% CI= 22.9, 32.1) and they had significantly low scores (p<0.001) in all four domains of Quality of Life. Measures need to be taken to manage Post Mastectomy Pain Syndrome and improve Quality of Life of patients.

Keywords: breast cancer, mastectomy, pain, quality of life

1. Introduction
Breast cancer is the number one cancer among female accounts for 12% of global cancer incident and 25% of all cancers of female [1] similar situation can be identified in Sri Lanka too. According to the world health ranking Sri Lanka is in the 124 position in the world's breast cancer incidence [2]. According to the National Cancer Control Program, Sri Lanka there were 8970 new cancer cases reported in 2010. Out of them more than one quarter of the (n=2401, 26.77 %) cases were breast cancers [3]. According to the published data by National Cancer Control Program Sri Lanka, there were 1321 new breast cancer patients registered in 2009 [4]. In Sri Lanka, Mastectomy is the major treatment option offered for breast cancer patients. However, mastectomy causes many complications such as infection, psychological distress, sexual dissatisfaction, cosmetic trauma and many more [5, 6]. Post Mastectomy Pain Syndrome (PMPS) is a one complication which is specific for the mastectomy [7, 8].
PMPS is define as a "chronic neuropathic pain on axilla, medial arm, breast and the chest wall which lasting more than three months following breast surgery" [9]. It is a kind of neuropathic pain commonly manifest as aching, burning, shooting and throbbing in nature lead to functional disability in patients [10]. Studies in different settings indicate that high prevalence of PMPS and poor attention to manage it [11, 12]. American cancer society stated that PMPS develop between 20% to 30% of women following breast surgery [13].
PMPS may occur due to direct nerve injury as a result of compression, stretching, retraction and ischemia during operation Jeannie *et al*., (2015). Breast cancer surgery can damage brachial plexus nerve, intercosto-brachial nerve, lateral cutaneous branch of the second intercostal, long thoracic, medial and lateral pectoral nerves that innervate the breast, chest wall, ipsilateral arm and the shoulder [14]. Eventually patients develop neuropathic pain limit their day today activities and detriment quality of life of the breast cancer survivals [9, 11, 15]. However, there is no currently available evident on PMPS in Sri Lankan context. Our main objective was to determine the prevalence of PMPS among clinic followed up patients and assess its impact on quality of life.

2. Materials and methods
We conducted a cross-sectional descriptive study at National Cancer Institute Maharagama, Sri Lanka from August to September 2016. We obtained ethical approval from Ethics Review Committee at National Institute of Health Sciences, Sri Lanka. We recruited patients

underwent mastectomy at least 03 months before the data collection. However, we excluded patients with musculoskeletal disorders, metastasis, and patients were on either chemotherapy or radiotherapy as those factors themselves cause pain and act as a confounder for the PMPS. Informed written consent was taken from each participant while patients' privacy and confidentiality were protected.

We used a pre-tested judgmentally-validated questionnaire to obtain socio-demographic data and World Health Organization Quality Of Life (WHO-QOL-BREF) questionnaire which has been validated in local context to assess patients' quality of life [16]. WHO-QOL-BREF tool has four domains, namely physical, psychological, Social and environment. Each domain score of participants were calculated and converted to domain score according to the WHO guidelines [17]. "Higher score" indicated better quality of life.

The PMPS, the main variable in this study, was defined PMPS as "perceived pain of the patient following at least 3 months after mastectomy over surgical scar, anterior chest wall, ipsilateral arm and ipsilateral shoulder in the nature of aching, burning, shooting and throbbing". Perhaps, many international literature used the similar definition for PMPS as in the present study [9, 11]. Pain was assessed using numerical pain scale. Pain was categorized into mile, moderate and severe level according to the pain score [18].

Data analysis was done using a computer package. Continuous data were analyzed with student "t" test and presented with means and standard deviations. The categorical data were analyzed with chi-squared test. Results were presented as percentages chi-squared and "*p*" values. Multivariate analysis was used to identify most important factors associated with the PMPS. Significance level was taken as 5% and respective "*p*" values were described.

3. Results

Three hundred sixty patients were interviewed. The mean age of the sample was 54.5 (SD = 9.9 years) with age range of from 27 to 75 years.

Table 1: Distribution of the age of the study population

Age category	Frequency	Percentage (%)
Young patients*	124	34.44
Old patients *	236	65.56
Total	360	100.00

*the young patients were considered as age ≤ 50 years and the old patients were considered as age> 50 years.

Prevalence of PMPS was 27.5 % (95% CI=22.9, 32.1) in the study. Most of the patients experienced aching type of pain. Further, 26.3 % of patients perceived burning pain whereas 19.2% and 20.2% perceived shooting and throbbing type of pain respectively. Reported pain over the chest wall and ipsilateral arm was almost similar (i.e., 35%). In addition, 18.2% patients perceived the pain over surgical scar while comparatively smaller percentage (12.1 %) experienced the pain over the ipsilateral shoulder. The severity of the pain was assessed using numerical pain scale and categorized as mild, moderate and severe. According to the categorization, half of the pain positive patients (52.5%) experienced moderate pain while 7.1% and 40.4% experienced severe pain and mild pain, respectively.

Table 2: Characteristics of the Post Mastectomy Pain Syndrome

variable	Frequency (n = 99)	Percentage (%)
Type of the pain		
Aching	34	34.3
Burning	26	26.3
Shooting	19	19.2
Throbbing	20	20.2
Site of the pain		
Over the scar	18	18.2
Over the chest wall	34	34.3
Ipsilateral arm	35	35.4
Ipsilateral shoulder	12	12.1
Severity of the pain		
mild pain	40	40.4
moderate pain	52	52.5
severe pain	7	7.1
Total	99	100.0

The quality of life of the patients with PMPS assessed using WHO-QOL-BREF. Subsequently quality of life compared between PMPS positive and PMPS negative patients. The mean scores of each domain analyzed between both groups. Patients with PMPS had significantly low mean scores in all four domains than patients without PMPS (p<0.001).

Table 3: Comparison of domains sores in WHO-QOL-BREF among patients with and without PMPS

Domain	PMPS positive n=99	PMPS negative n=261	Significance
	Mean (SD)	Mean (SD)	
Physical	53.65 (13.66)	67.12 (15.74)	<0.001
Psychological	48.23 (14.24)	65.11 (15.24)	<0.001
Social relationship	43.25 (18.86)	58.75 (20.03)	<0.001
Environment	59.99 (14.42)	68.15 (14.71)	<0.001

The socio-demographic characteristics of the study sample were analyzed in relation to the PMPS (Table 4). Patients age less than or equal to 50 years have higher chance to develop PMPS compare to older patients (p<0.001). However, other selected socio-demographic characteristics did not show a significant association with PMPS

Table 4: Association of the social-demographic characteristics with PMPS

Characteristic	PMPS positive (n=99)	PMPS negative (n=261)	Total	Significance
	No. (%)	No. (%)	No. (%)	
Age (in years)				
≤ 50	62 (62.6)	62 (23.8)	124 (34.4)	<0.001
> 50	37 (37.4)	199 (76.2)	236 (65.6)	
Ethnicity				
Sinhalese	76 (76.8)	223 (85.4)	299 (83.05)	0.051
Non-Sinhalese	23 (23.20)	38 (14.6)	61 (16.94)	
Religion	.			

Buddhist	65 (65.7)	186 (71.3)	251 (69.72)	0.301
Non-Buddhist	34 (34.3)	75 (28.70)	109 (30.27)	
Marital status				
Currently married	90 (90.9)	226 (86.6)	316 (87.77)	0.264
Currently unmarried	9 (9.1)	35 (13.4)	44 (12.22)	
Number of children				
No children	15 (15.2)	35 (13.4)	50 (13.89)	0.67
Had children	84 (84.8)	226 (86.6)	310 (86.11)	
Total (%)	99 (100.0)	261 (100.0)	360 (100)	

χ^2 = chi square value, df = degree of freedom

Table 5: continued

Characteristic	PMPS positive (n=99) No. (%)	PMPS negative (n=261) No. (%)	Total No. (%)	Significance
Level of education				
≤ O/L	64 (64.6)	178 (68.2)	242 (67.2)	0.411
Above O/L	35 (35.4)	83 (31.8)	118 (32.8)	10.521
Employment status				
Currently employed	24 (24.2)	50 (19.2)	74 (20.6)	1.137
Currently unemployed	75 (75.8)	211 (80.8)	286 (79.4)	10.286
Monthly income (SLR)				
≤ 20,000	79 (79.8)	195 (74.7)	274 (76.1)	1.021
>20,000	20 (20.2)	66 (25.3)	86 (23.9)	10.312
Concurrent diseases				
Present	40 (40.4)	129 (49.4)	169 (46.9)	2.345
Absent	59 (59.6)	132 (50.6)	191 (53.1)	10.126
Total (%)	99 (100.0)	261 (100.0)	360 (100)	

χ^2 = chi square value, df = degree of freedom

We studied association between PMPS with duration from surgery and type of surgery. The duration from the surgery calculated from date of surgery to date of data collection. The mean duration from the surgery was 16.4 (SD=23.3) months. The duration was categorized in to two as equal or less than 18 months and more than 18 months. PMPS was significantly higher (p<0.001) among patients participated to the study equal or less than 18 months following surgery. The type of surgery was divided in to simple mastectomy and mastectomy with axillary clearance. Results showed PMPS was high among patients underwent mastectomy with axillary clearance than others.

Table 5: Distribution of PMPS according to duration and type of the surgery.

	PMPS positive n=99 Frequency (%)	PMPS negative n=261 Frequency (%)	Total (%)	χ^2 Df p value
Duration from the surgery				
≤ 18 months	92 (92.9)	197 (75.5)	289 (80.3)	13.805
>18 months	7 (7.1)	64 (24.5)	71 (19.7)	1<0.001
Type of the surgery				
Mastectomy only	7 (7.1)	45(17.2)	2(14.4)	6.008
With axillary clearance	92(92.9)	216 (82.8)	308 (85.6)	10.014
Total (%)	99 (100.0)	261 (100.0)	360 (100.0)	

χ^2 =chi square value, df = degree of freedom

In bivariate analysis age, duration from the surgery and mastectomy with axillary clearance were significantly associated with development of PMPS. However, multi variant analysis showed age was the most important factor determine the PMPS.

Table 6: Multivariate analysis to determine the most important factor associated with PMPS

variable	B coefficient	95% confident interval		p value
		Lower limit	Upper limit	
Age ≤ 50	4.953	2.976	8.238	< 0.001
Duration ≤ 18 months	3.457	1.473	8.112	0.004
with axillary clearance	2.716	1.123	6.566	0.027
Constant	0.027			<0.001

6. Discussion

In the present study, information of 360 patients were analyzed; out of them, 99 (27.5%) patients met the criteria of PMPS. American cancer society stated that, the prevalence of PMPS accounting between 20 % to 30% [13]. The prevalence of PMPS in the present study was also within same range. Almost similar prevalence of PMPS to present study was reported in China [11]. Another study was

conducted in Aberdeen, Scotland by Smith *et al*., (1999) [19] found that 29 % of patients had symptom of PMPS [19]. Study conducted in Odense University by Vilholm *et al*., (2008) [12] said that 23.9 % patient developed PMPS [12].

Pain is an unpleasant sensory and emotional experience perceived by individual [20, 21]. However it is highly subjective and perceived severity is varied perhaps due to various tolerance level of the people [22]. The severity of pain assessed in this study using numerical pain scale. According to the results 40 % of patients reported mild pain whereas 52.5 % and 7.1 % reported as moderate and severe pain, respectively. The different results were noted by Vilholm *et al*., (2008) [12] as majority of patient (80 %) had mild pain, while 16 % of patients had moderate pain and small proportion 3.2 % of patients had severe pain [12]. The visual analog scale was used to assess the PMPS by Beyas *et al*., (2016) and found that majority of patients (78.6 %) noted mild pain while 21.4 % of patients noted moderate pain and none of the patients noted severe pain [9].

Socio-demographic characteristics were assessed in relation to the PMPS. We found that, prevalence PMPS was significantly high among younger patients (age ≤ 50 years) than older group (p<0.001). Similar pattern was noticed by Viholm *et al*., (2008) and stated that younger patients are more likely develop PMPS (OR=1.04; 95% C.I.1.01 to 1.08) compare to older patients [12]. Similar results are reported in previous studies as well [11]. This suggest that, younger patients have more aggressive disease condition due to high estrogen receptor level, as a result they need more invasive surgery which cause more damage to the tissues [23]. Young women are more anxious and sensitive to pain which may attribute to high prevalence of PMPS. Other than the "age", socio-demographic factors do not associate with PMPS similar to the other studies [11, 19].

Duration since surgery was a factor which showed significant association with PMPS in the present study. The results showed that patients participated to the study within first 18 months following surgery had high chance to develop PMPS than others (p<0.001). This is consistent with the finding of Smith *et al*., (1999) [19] which stated symptoms of PMPS were decreasing in intensity with the time [19]. Also Variawa *et al*., (2016) [23] noted that majority of patients (72 %) in their study population having PMPS were from 3 month to 20 month following mastectomy [23]. Further, intensity of PMPS diminish over the period time perhaps due to patients were able to develop adaptation to the condition and physiological alteration of pain receptors over the period time [24] However, different findings were detected in the prospective cohort study conducted by Macdonald *et al*., (2005) [25]. They followed up 113 patients and found that 52 % of them had a symptoms of PMPS even after six years later [25].

The study noted patients underwent mastectomy with axillary clearance had high chance to develop PMPS than patients u,nderwent mastectomy only (p=0.014). This is expected as more invasive axillary clearance leads to more nerve damage including brachial plexus which innervate breast, arm and shoulder [26]. This finding is comparable to many international literature [27, 28].

The present study compared the quality of life of patients positive for PMPS and patients without PMPS. The results showed that patients with PMPS had significantly low (p<0.001) mean scores in all four domains. This result was highly expected as almost 60 % of patients perceived either moderate or severe pain and invariably it had a negative impact on all the strata of quality of life. The pain has direct effect on psychological aspect of the patients and limit physical activity. On the other hand it restricts social relationship and indirectly cause adverse perception toward living environment [29]. Similar result were obtained in the study conducted by Beyas *et al*., (2016) which used SF-36 to assess the quality of life of PMPS positive patients. Results showed mean scores were significantly low (p<0.001) in all eight scales among PMPS positive patients than PMPS negative patients [9]. Meijuan *et al*., (2013) [11] used sane SF-36 tool to assessed quality of life among PMPS positive patients and result showed mean scores were significantly low (p<0.05) among PMPS positives in all scales except for physical function and social function scales [11].

7. Conclusions

It was quite evident that PMPS had huge adverse impact on patients' perceived quality of life in all parameters. More attention must be paid in relation to identify PMPS and proper management of it. This open another dimension in the management of post mastectomy patients in order to enhance their living standard.

8. Acknowledgement

We appreciate the support given by the Director National Cancer Institute (Presently re-name as Apeksha Hospital) Maharagama, Sri Lanka and all medical staff in the oncology and onco-surgical clinics.

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