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Exploring Unseen Realities: The Impact of Brassiere on Breast Discomfort - A Cross-sectional Analytical Investigation

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ABSTRACT

Background: Women typically begin wearing bras at the age of 8 to 11. There are around 23 different styles of bras worldwide. According to research by McGhee and Steele (2010), 70% of women wear bras that are either the wrong size or poorly fitted. Wearing a poorly fitting bra can cause breast pain because the bra's components can dig into the breast tissue. This is because breasts come in a wide range of sizes and volumes, and one bra design may not be suitable for all. It has also been found that as the level of support provided by a bra increases, the intensity of breast pain decreases. This is because a well-fitting bra reduces the range of motion, velocity, and acceleration of the breast tissue. This highlights the necessity to examine the suitability of bras on a case-by-case basis. Existing literature often advises that wearing a properly fitting and supportive bra can alleviate symptoms of breast soreness.

Methodology: Non-experimental design, was conducted in close proximity of Chengalpattu in the year 2022. Participants were selected based on specific criteria for inclusion and exclusion. The participants' brassiere sizes were observed and measured using Triumph criteria. Subsequently, a statistical analysis was conducted to determine the disparity between the bra size that was being worn and the true bra size.

Outcome Measure: Brassiere size worn and Triumph Guidelines

Result &Conclusion: This study determines that there is a notable disparity in bra size among participants who reported experiencing discomfort of moderate and severe intensity.

Keywords: *Cyclic Mastalgia, Extrinsic factors, Inappropriate Brassiere size, Triumph Criteria.*

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1. INTRODUCTION

Breast pain is clinically referred to as "Mastalgia or Mastodynia." Mastalgia is a prevalent issue that affects women, with over 70% of women having breast discomfort at least once in their lifetime. The worldwide occurrence of Mastalgia is from 41 to 79% [1], while in metropolitan areas of India, it is around 51-54%. Cyclic Mastalgia occurs as a result of hormonal stimulation of the breast tissue, specifically towards the conclusion of the luteal phase of the menstrual cycle

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[2,3].

Mastalgia can be attributed to several factors, such as increased levels of estrogen and prolactin, decreased levels of progesterone, fluctuations in estrogen and progesterone, irregular menstrual cycles, use of oral contraceptives, hormone therapy, psychotropic medications, certain cardiovascular drugs (e.g. digoxin, spironolactone), psychological factors, emotional stress, elevated levels of plasma fatty acids, heightened hormone levels, acute stress, and elevated prolactin levels. The precise etiology of cyclic Mastalgia remains uncertain. Girls typically begin wearing bras between the ages of 8 and 11. There are approximately 23 different styles of bras available worldwide, including underwired, pushup, balconette, bralette, strapless, tube, sports, T-shirt, beginners, transparent, bridal, multiway, plunge, cage, halter, nursing, stick-on, full figure, padded, minimizer, and racerback bras. The components of a bra are the Front strap, Backstrap, Cups, Centre gore, underwires, under band, Hookeye, Slider, and ring. Bra size is often determined by measuring the circumference of the chest just below the breasts (under bust) and around the fullest part of the breasts (over bust). The anthropometric measurement of breast volume is influenced by factors such as hormonal fluctuations, body fat composition, the time of the reproductive cycle, and breast pathology [3,4].

According to Greenbaum, Heslop, and Morris [1], over 70% of women use bras that are either the wrong size or badly fitted. Ryan hypothesized that wearing a bra that lifts the breasts causes an increase in downward pressure on the outer scapulae[2]. He proposed that the posterior straps of a bra function as pulleys over the shoulders, thereby increasing the total downward force on both shoulders by two-fold. The pressure exerted by bra straps is moderately associated with bust size. Women with smaller busts may suffer significant downward strain on their shoulders when wearing tight straps [7, 8, 9].

Studies have found that wearing a bra with higher levels of support can reduce the degree of breast pain. This is because it limits the range of motion, speed, and rate of change in speed of the breast tissue (Mason et al., 1999; Scurr et al., 2010). There is a hypothesis that suggests a bra that does not fit well can cause breast pain (McGhee & Steele, 2010) because the parts of the bra can press into the breast tissue. Prior studies on women with larger breasts have suggested that the wide variation in breast masses and volumes makes it impractical for a single bra design to adequately provide the same amount of support for all individuals (McGhee et al., 2013). This highlights the necessity to examine the suitability of bras on a case-by-case basis. Existing literature often suggests that wearing a properly fitting and supportive bra can help alleviate symptoms of breast soreness.

The previous research examined the prevalence rate and psychological aspects associated with Mastalgia. However, the discussion on external factors that contribute to Mastalgia remains unclear. While various external factors can contribute to breast pain, focusing the study on a specific area will enhance its scope. One common factor is that women often wear ill-fitting bras due to a lack of knowledge about anthropometric measurement, which can result in repetitive strain. This study examines the relationship between brassiere size and breast volume in people experiencing cyclic Mastalgia. This study also informs women about the external factors that can cause breast pain, in order to change the idea that Mastalgia is always associated with breast cancer.

2. LITERATURE REVIEW

Brassiere And Breast Pain

João Augusto et al [10] Lombardi et al this study concludes that wearing appropriate brassiere in relation with breast size and illustration on physical exercise will significantly reduce these complication Chris Malbon et al [11] this study states that 71% of participants stated that they will use a sports bra because it improves their overall comfort and support. Jenny Burbage et al[12]this study states that sports brassiere signifies comfort and prevent breast movement and reduces the breast pain. Celeste E Coltman et al [13] this article, research shows that female troops have bra integration issues, breast soreness, and breast damage when wearing body armour. Given the growing number of women in military organisations, measures to overcome these challenges for female body armour users, particularly those with larger breast sizes, are critical. Emma_Sharland et al[14]This study shows that patient with breast pain preferred brassiere style as important rather than comfort, support and fit and aesthetic were essential brassiere performance characteristics. Chris Malbon et al [15] According to the findings, the most popular bra design is underwired (71%), and the most prevalent UK bra size is 34B (9%). The key areas where the body armour scratched or caused discomfort were the left and right anterior mammary regions, as well as the posterior lateral sacrum. Understanding the distribution of bra size, bra type, and areas of pain or rubbing helps us better understand the issues that female police officers face and how body armour design may be improved. Amit Goyal et al[16]this systematic review concludes that medications combined with brassiere wearing significantly proven to be effective among patient with mastalgia. Myint Oo et al [17] This paper indicates that there is a substantial positive relationship between shoulder-neck discomfort and big brassiere cup size. Katherine Wood, et al [18]this article, young, nulliparous women have thoracic pain that is not connected to breast size. Bra fit is only moderately associated with menstrual cycle stage, indicating that hormonal changes or reproductive stage may have impacted this study.

Methodology

This study is a non-experimental investigation carried out in the year 2023. The research paper has received ethical approval from the SRM Institute's Ethical Committee. The study recruited women aged between 20 and 40 years. The participants include individuals experiencing discomfort originating from the chest wall, pregnant individuals, those with irregular menstrual cycles, women undergoing hormone therapy, individuals experiencing breast pain accompanied by a lump, and individuals diagnosed with breast cancer. The study excluded psychiatric problems and cardiovascular ailments.

Before collecting sample, the participants who joined the study were given information on the purpose and process of the study. This included a short introduction by the researcher on cyclic Mastalgia, followed by obtaining their informed consent using a consent form.

The participants' bra sizes were recorded, and their actual bra sizes were measured according to Triumph norms.

According to triumph guidelines , The measurement will be taken just below the bust quite tightly but comfortable enough to allow you to breathe normally, then note the measurement from the tape. For the cup size the measurement will be taken on the widest part of the bust with a fairly loosely measuring tape in order not to deform or squeeze the breast, ensure that measuring tape is at the same height across the bust as across your back. Then note down the measurement.

The discrepancy between the bra size worn and the actual bra size was then analysed using SPSS software.

3. TIRUMPH GUIDELINES

Table of Sizes											
Bra size (Under bust size)	30	32	34	36	38	40	42	44	46	48	50
Under bust circumference in cm	63-67	68-72	73-77	78-82	83-87	88-92	93-97	98-102	103-107	108-112	113-117
Cups Size	Bust circumference in cm										
AA	75-77	80-82	85-87	90-92	95-97	100-102	-	-	-	-	-
A	77-79	82-84	87-89	92-94	97-99	100-102	107-109	112-114	117-119	122-124	127-129
B	79-81	84-86	89-91	94-96	99-101	104-106	109-111	114-116	119-121	124-126	129-131
C	81-83	86-88	91-93	96-98	101-103	106-108	111-113	116-118	121-123	126-128	131-133
D	83-85	88-90	93-95	98-100	103-105	108-110	113-115	118-120	123-125	128-130	133-135
E	82-87	90-92	95-97	100-102	105-107	110-112	115-117	120-122	125-127	132-134	135-137
F	87-89	92-94	97-99	102-104	107-109	112-114	117-119	122-124	127-129	134-136	137-139
G	89-91	94-96	99-101	104-106	109-111	114-116	119-121	124-126	129-131	136-138	139-141
H	91-93	96-98	101-103	106-108	111-113	114-118	121-123	126-128	131-133	140-142	141-143
I	93-95	98-100	103-105	108-110	113-115	118-120	123-125	128-130	133-135	142-144	142-144
J	95-97	100-102	105-107	110-112	115-117	120-122	125-127	130-132	135-137	144-146	145-147
K	97-99	102-104	107-109	112-114	117-119	122-124	127-129	132-134	137-139	146-148	147-149

FIG I

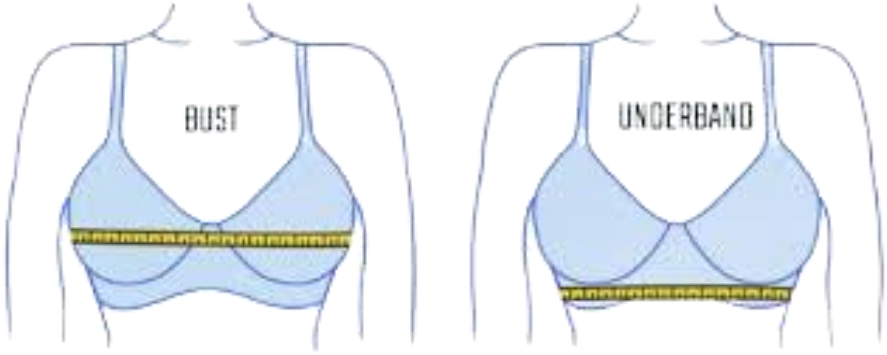

FIG II

4. RESULTS

Table Depiciting The Participants Age

Table 1

AGE	FREQUENCY	PERCENTAGE
17-19	67	17.6%
20-30	266	69.8%
31-42	48	12.6%

Table illustrates the participants age in which the participants between 17-19 years are 17.6%, 20-30 years are 69.8%, 31-42 years are 12.6%.

Table Ii Table Illustrates The Participants Intensity Of Pain

PHASES OF PAIN	FREQUENCY	PERCENTAGE
No pain	59	15.5%
Mild	170	44.6%
Moderate	141	37.0%
Severe	11	2.7%

Table illustrates the participants intensity of pain in which participants with no pain are 15.5%, participants with mild pain are 44.6%, participants with moderate pain are 37% and severe pain are 2.7%.

Table Iii Table Illustrates The Percentage Of Participants Wear Appropriate And Inappropriate Brassiere

PHASES OF PAIN	PARTICIPANTS WEAR APPROPRIATE BRASSIERE		PARTICIPANS WEARN INAPPROPRIATE BRASSIERE		p-value
	FREQUENCY	PERCENTAGE	FREQUENCY	PERCENTAGE	
Mild	74	43.8%	96	56.2%	0.010*
Moderate	44	31.2%	97	68.8%	
Severe	7	60.0%	4	40.0%)	

Table illustrates the participants with Mild pain, 43.8 % of them wear appropriate brassiere size, the participants with moderate pain ,31.2 % of them wear appropriate brassiere size, the participants with severe pain 60% of them were appropriate brassiere size, On parallel the participants with Mild pain, 56.2 % of them wear in appropriate brassiere size, the participants with moderate pain, 68.8 % of them wear in appropriate brassiere size, the participants with severe pain,

40% of them were in appropriate brassiere size

Table Iv Table Illustrates The Mean Value Of Participants Brassiere Size Worn And Actual Brassiere Size

PHASES OF PAIN	BRASSIERE SIZE WORN		ACTUAL BRASSIERE SIZE	
	MEAN	SD	MEAN	SD
Mild	35.2	4.4	36.2	4.9
Moderate	36.4	4.4	37.2	4.8
Severe	37.2	4.9	38.0	5.3

Table illustrates the mean value of participants brassiere size worn and Actual Brassiere size, in which the mean value of brassiere size worn among participants with mild pain is 35.2, moderate pain is 36.4 and Severe pain is 37.2 on parallel the mean value of brassiere size worn among participants with mild pain is 36.2, moderate pain is 37.2 and severe pain is 38.

Table V Table Illustrates The Pain Level Reported In Different Menstruation Phase

PHASES	MILD		MODERATE		SEVERE		
Overall	FREQUENCY	PERCENTAGE	FREQUENCY	PERCENTAGE	FREQUENCY	PERCENTAGE	<0.001
	96	62.3%	57	37%	2	0.06 %	
Luteal	57	43.2%	66	50%	9	6.8%	
Follicular	16	47.1%	18	52.9%	0	0	

Table illustrates the pain level reported in different menstruation phases in which the participants with mild pain 62.3 % of them reported in Overall phase, 43.2 % of them reported in luteal phase, 47.1% of them reported in follicular phase. The participants with moderate pain 37% % of them reported in Overall phase, 50 % of them reported in luteal phase, 52.9% of them reported in follicular phase. The participants with Severe pain 0.06% % of them reported in Overall phase, 6.8 % of them reported in luteal phase.

5. DISCUSSION

Breast pain is a common occurrence in modern times, with numerous internal and environmental causes contributing to its onset, including cyclic patterns. Mastalgia is caused by hormonal stimulation of the breast, especially towards the end of the luteal phase of the menstrual cycle. While the exact external variables that contribute to breast pain are still unclear, Mastalgia can also arise owing to physiological changes. Various external causes, such as inadequate breast hygiene, improper bra selection, and incorrect bra size, might contribute to breast pain. There are different types of bra models available for different situations, but they still follow a similar design. However, determining the suitable size is difficult owing to a lack of experience in anthropometric measurement. While there is variation in the size and form of breasts among individuals, the majority of breasts have a tear-shaped appearance [19-21].

The breast is comprised of breast tissue, which makes up around two-thirds of its composition. This tissue consists of fascial planes that serve the purpose of dividing the glandular parts in the breasts into lobules. These lobules are responsible for draining ducts that lead to the nipple during breastfeeding, as stated by Haycock in 1978. The skin, a pliable and resilient outer layer, offers an additional means of support to the breast (Page & Steele, 1999). According to Cohen (2002), women with an average 'B' cup size have breasts that weigh between 5 and 7 pounds, whereas women with an average 'D' cup size have breasts that weigh between 15 and 23 pounds[22-24].

The breasts are subject to the force of gravity, and without adequate support, the ligaments and delicate breast tissue may gradually stretch and become distended, resulting in elongation of the breast tissue and a pendulous appearance. Women

in their middle age residing in underdeveloped regions of the world, where they do not wear supporting undergarments for their breasts, experience a condition where their breasts become flattened and pendulous. The breasts of most women tend to become flatter and longer as they age. However, this process occurs at a faster rate if a supporting garment is not worn (Haycock, 1978). Gravity causes the descent of the breasts, as well as the sagging of the throat and facial tissue (The Buststop, 2004). Half of the female population experiences breast pain, which is a notable problem (Scurr et al., 2014). However, it has been shown that appropriate breast support can decrease or completely alleviate these symptoms (Hadi, 2000). In the past, when studying breast biomechanics, researchers have typically measured two variables (bra discomfort and breast pain) subjectively. This was done before, during, and/or after physical exercise, often using numeric rating scales. However, the advantages of visual analogue scales have been overlooked [25-28].

This study sought to ascertain the prevalence rate of ill-fitting brassiere sizes among participants experiencing cyclic Mastalgia. It was a non-experimental study conducted in the year 2023, and participants were recruited based on certain inclusion and exclusion criteria. The participants were instructed to report the size of the bra they were wearing, and the real size of their breasts was measured according to the parameters provided by Triumph. The study findings indicate that among the 317 participants, 52% reported experiencing mild pain, 44% reported experiencing moderate pain, and 3% reported experiencing severe pain.

When focusing on the objective of the study, it is found that out of 170 participants who experience mild pain 74 participants wore appropriate brassiere size whereas 96 participants wore inappropriate brassiere size, along with out of 141 participants who experience moderate pain 44 of them wore inappropriate brassiere size and 97 of them wore inappropriate brassiere size and participants reported severe pain 7 of them wore appropriate brassiere size and 4 of them wore inappropriate brassiere size. Table 4 depicts out of 53% of participants who experienced mild pain wore bras of size 35, based on anthropometric measurements. However, they should actually be wearing bras of size 36. Similarly, 44% of participants who reported moderate pain wore bras of size 36, but they should be wearing bras of size 37. Lastly, 3% of participants who reported severe pain wore bras of size 37, but they should be wearing bras of size 38, according to anthropometric measurements.

Table 5 depicts the stages of the pain. Among the 169 participants, who indicated experiencing discomfort at a mild level, A total of 96 participants reported symptoms across the entire phase, with 57 reporting symptoms during the luteal phase and 16 reporting symptoms during the follicular phase. Among the 141 participants who experienced pain of moderate severity, 57 of them reported pain throughout the entire phase. 66 cases were documented during the luteal phase. 18 people reported experiencing pain during the follicular phase. Out of the 10 participants who reported severe pain, 9 had it during the luteal phase, while 1 participant experienced it throughout the entire menstrual cycle. Women have consistently worn brassieres on a daily basis since their adolescence. Typically, the majority of brassieres feature parallel straps that extend from the front to the rear over the shoulders. The breasts' weight exerts pressure on the straps, leading to the straps digging into the outer shoulder and elongating the UT muscle, resulting in discomfort. Research indicates that prolonged pressure on the upper trapezius region leads to heightened activation of the upper trapezius muscle, which in turn creates trigger points that provide discomfort due to pressure. According to a study, wearing a brassiere may be a contributing factor to pain in the upper trapezius region, caused by the weight of the breasts. The primary focus of shoulder kinematics is the movement of the scapula during arm elevation. Several factors, including muscle strength, generalized hyperlaxity, and posture, may contribute to this difference. However, it is important to consider that women wear bras daily, which affects shoulder movement due to the structure of the bra, such as the straps and band, which tighten the scapula, clavicle, and thorax. Approximately 70% of women use bras that are either the wrong size or poorly fitting[29-30]. A study suggested that wearing a bra causes the breasts to be lifted, exerting a downward force on the outer scapula. Additionally, the posterior straps of the bra function as pulleys across the shoulders, resulting in an increased overall downward draw on both shoulders. Women with small busts who have tight bra straps may also endure significant downward pressure on their shoulders. Bras have a crucial function in offering external support to the breasts, however, it is the straps that most contribute to the musculoskeletal difficulties that women with large breasts endure. The continuous use of bras causes the weight of enormous breasts to be exerted on the upper part of the shoulder through the bra straps. This results in deep furrows and soft tissue damage at the point where the bra strap meets the shoulder. The size and mass of breasts undergo changes throughout a person's life, primarily due to hormonal fluctuations, body fat composition, the stage of the reproductive cycle, and any breast-related medical conditions. When properly adjusted in accordance with established norms in the industry, bra size can serve as a rough approximation of breast size. Bra size is not a reliable indicator of breast mass, but for women who have never been pregnant or had any breast problems, it is likely to be a constant metric. Bra-sizing and fitting are acquired competencies, and the majority of women lack formal training in these areas, leading them to make unaided decisions when purchasing bras. Women, especially those with larger busts, may feel embarrassed and self-conscious when it comes to getting their bra size measured. This might lead them to postpone appointments for professional bra measurement and instead try to size and fit their own bras. Niddam et al. (2014) further state that the variations in bra sizing among different nations and bra manufacturers can be perplexing for both patients and practitioners. The challenges related to finding a well-fitting bra for women with larger breasts indicate that this group of women may require a more precisely tailored bra to alleviate breast discomfort, as advised.

The conclusion of this study highlights that, despite the existence of different types of bra models for different activities, there is still a lack of knowledge regarding the accurate measurement of anthropometric factors for determining bra size. Additionally, the study found that participants with Mastalgia (breast pain) reported experiencing pain throughout all reproductive phases due to wearing inappropriate bra sizes. The prediction regarding external factors such as wearing an ill-fitting bra and experiencing breast pain is uncertain.

6. CONCLUSION

This study establishes that there is a notable disparity in bra size among participants who reported experiencing pain of moderate and severe intensity. This study also finds that women's expertise of anthropometry measurement is still lacking due to an inadequate manual booklet provided by the makers. It is crucial for bra producers to have a comprehensive grasp of the correlation between breast volume and bra size. This understanding is necessary to enable accurate bra fitting and to determine the appropriate level of support that a bra should offer.

REFERENCES

[1] Greenbaum AR, Heslop T, Morris J: An investigation of the suitability of bra fit in women referred for reduction mammaplasty. Brit J Plast Surg 2004, 56(3):230-236

[2] Ryan EL: Breast weight and industrial fatigue. Med J Aust 1984, 147(5):261.

[3] Butler LM, Gold EB, Greendale GA, Crandall CJ, Modugno F, Oestreicher N, Quesenberry CP Jr, Habel LA: Menstrual and reproductive factors in relation to mammographic density: The Study of Women's Health Across the Nation (SWAN). Breast Cancer Res Treat in press. 2007, Dec 9

[4] Scheurnhammer ES, Tworoger SS, Eliassen AH, Missmer SA, Holly JM, Pollak MN, Hankinson SE: Body shape throughout life and correlations with IGFs and GH. Endocr Relat Cancer 2007, 14:721-732.

[5] Triumph International: Brastylist: Books of bras. Triumph International Australia 2005.

[6] Jeffreys M, Warren R, Highnam R, Davey Smith G: Breast cancer risk factors and a novel measure of volumetric breast density: A cross-sectional study. Br J Cancer 2008, 98:210-216.

[7] Findikcioglu K, Findikcioglu F, Ozmen S, Guclu T: The impact of breast size on the vertebral column: A radiologic study. Aesthetic Plast Surg 2007, 31:23-27.

[8] Greenbaum AR, Heslop T, Morris J: An investigation of the suitability of bra fit in women referred for reduction mammaplasty. Brit J Plast Surg 2004, 56(3):230-236.

[9] (Cairncross, 2010; “Cyclical breast pain - Treatment,” 2012; Pearlman & Griffin, 2010; Rosolowich et al., 2006; Wilson & Sellwood, 1976)

[10] João augusto lombardi relationship of female breasts to physical activity, exercise and sport rev bras med esporte – 2024; vol. 30 – e2022_0122 doi: http://dx.doi.org/10.1590/1517-8692202430022022_0122i

[11] Chris Malbo The effect of underwired and sports bras on breast shape, key anthropometric dimensions, and body armour comfort The Police Journal: Theory, Practice and Principles 2022, Vol. 95(3) 436–458

[12] Jenny Burbage The incidence of breast health issues and the efficacy of a sports bra fit and issue service in British Army recruits ERGONOMICS 2021, VOL. 64, NO. 8, 1052–https://doi.org/10.1080/00140139.2021.1895324

[13] Coltman CE, Brisbine BR, Steele JR. Bra-body armour integration, breast discomfort and breast injury associated with wearing body armour. Ergonomics. 2021 Dec;64(12):1623-1633. doi: 10.1080/00140139.2021.1951849. Epub 2021 Aug 3. PMID: 34236015.

[14] Emma Sharland Multi-study randomised controlled trial to develop, implement and evaluate bra prescription to reduce breast pain and improve quality of life Complementary Therapies in Clinical Practice Volume 43, May 2021, 101346 https://doi.org/10.1016/j.ctcp.2021.101346

[15] Malbon C, Knock DC, Critchley DR, Debra J Carr P. The effect of breast size and bra type on comfort for UK female police officers wearing body armour. Appl Ergon. 2020 Apr;84:103012. doi: 10.1016/j.apergo.2019.103012. Epub 2019 Dec 5. PMID: 31987508.

[16] Kataria K, Dhar A, Srivastava A, Kumar S, Goyal A. A systematic review of current understanding and management of mastalgia. Indian J Surg. 2014 Jun;76(3):217-22. doi: 10.1007/s12262-013-0813-8. Epub 2013 Feb 5. PMID: 25177120; PMCID: PMC4141056.

[17] Oo M, Myint Z, Sakakibara T, Kasai Y. Relationship between brassiere cup size and shoulder-neck pain in

women. Open Orthop J. 2012;6:140-2. doi: 10.2174/1874325001206010140. Epub 2012 Apr 4. PMID: 22509231; PMCID: PMC3322448.

[18] Wood K, Cameron M, Fitzgerald K. Breast size, bra fit and thoracic pain in young women: a correlational study. Chiropr Osteopat. 2008 Mar 13;16:1. doi: 10.1186/1746-1340-16-1. PMID: 18339205; PMCID: PMC2275741.

[19] McGhee, D.E., Steele, J.R. and Munro, B.J. (2010), "Breast support education improves bra knowledge and bra wearing behaviour in young female athletes: a randomised controlled trial", Journal of Physiotherapy, Vol. 56 No. 1, pp. 19-24.

[20] Lee, H.Y., Hong, K. and Kim, E.A. (2004), "Measurement protocol of women's nude breasts using a 3d scanning technique", Applied Ergonomics, Vol. 35 No. 4, pp. 353-9

[21] Sajad A. Salati1, Ahmed A. Alhumaid2Mastalgia: A narrative literature review of current understanding an d management, East Cent Afr J Surg. 2018 Apr;23(1):42-51 https://dx.doi.org/10.4314/ecajs.v23i1.9

[22] Sukanya Raghunath, Nagarathna Raghuram, Sandhya Ravi1, Nidhi C Ram, Amritanshu Ram, Prevalence of mastalgia in young Indian females Journal of Health Research and Reviews | Published by Wolters Kluw er – Medknow©2015

[23] Iddon J: Mastalgia; in Dixon JM (ed): ABC of breast disease, 3rd ed. Blackwell Publishing, Edinburgh, UK, 2006, pp. 15–18.

[24] Morrow M: The evaluation of common breast problems. Am Fam Physician 2000; 61: 2371–2378.

[25] Leung JW, Korguth PJ, Gotway MB: Utility of targeted sonography in the evaluation of focal breast pain. J Ultrasound Med 2002; 21: 521–526.

[26] Ader DN, South-Paul J, Adera T, Deuster PA. Cyclical Mastalgia: prevalence and associated health and behavioural factors. J Psychosom Obstet Gynaecol 2001;22(2):71–6.

[27] Gateley CA, Maddox PR, Pritchard GA, Sheridan W, Harrison BJ, Pye JK, et al. Plasma fatty acid profiles in benign breast disorders. Br J Surg 1992;79(5): 407-9.

[28] Ecochard R, Marret H, Rabilloud M, Boehringer H, Mathieu C, Guerin JF. Gonadotropin level abnormalities in women with cyclic mastalgia. Eur J Obstet Gynecol Reprod Biol 2001;94(1):92-6.

[29] Kumar S, Rai R, Das V, Dwivedi V, Kumar S, GG A (2010) Visualanalogue scale for assessing breast nodularity in non-discrete-lumpy breasts: the Lucknow Cardiff breast nodularity scale. TheBreast 19:238–242