ORIGINAL ARTICLE

Association of Body Mass Index with Pain Perception, Anxiety, Depression, and Disability in Fibromyalgia Patients

Shama Rani[1], Hira Ahmed[1], Saha Khan[1], Mohammad Amir[1]
College of Physiotherapy, Jinnah Postgraduate Medical Centre[1]
Corresponding Email: *shamarani911@hotmail.com*

Abstract

Background: A disorder of uncertain origin, Fibromyalgia (FM) is accompanied by pervasive pain, tiredness, disturbed sleep, and cognitive deficit. It has been related to depression, manic-depressive illness, and chronic fatigue. FM is negatively affected by obesity on both clinical and biological parameters.

Methods: A total of n=150 FM patients (132 Female and 18 Male) were included in the study. Initially, informed consent and demographic data were gathered from the participants. Afterwards, each patient's Body Mass Index (BMI) was calculated and classified into average weight, overweight, and obese categories. The Numeric Pain Rating Scale (NPRS) was used to quantify the intensity of pain, the Hamilton Anxiety Scale (HAM-A) was used to determine the participants' anxiety levels, the Hamilton Rating Scale for Depression (HAM-D) was used to examine their depression levels, and Health Assessment Questionnaire Disability Index (HAQ-DI) was used to measure their functional status. All these questionnaires were self-administered by the participants.

Results: In the NPRS, HAM-A, HAM-D, and HAQ-DI categories, no significant differences were found ($p>0.05$). However, between the BMI level and anxiety, a weak positive correlation was detected ($r=0.195$, $p=0.017$). BMI levels were not statistically significantly correlated with pain, depression, or disability ($r=0.011$, $p=0.0897$; $r=0.048$, $p=0.562$; $r=0.072$, $p=0.383$).

Conclusion: The results of the study revealed that there is no significant association of pain perception, anxiety, depression and disability with increasing BMI among FM patients except for a weak positive correlation with anxiety.

Keywords
Body Mass Index, Fibromyalgia, Pain, Obesity.

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Introduction

Fibromyalgia (FM) is a chronic condition often associated with widespread musculoskeletal pain involving both sides of the body and specific tender points[1]. It has several associated features, including cognitive disturbance, depression, anxiety, sleep disturbances, irritable bowel syndrome (IBS), fatigue and morning stiffness[1]. The pain of FM patients is divided into two categories, including 'allodynia', in which pain occurs due to something that should not cause pain. While 'hyperalgesia' increases pain from something that usually causes pain[2]. However, inflammation does not occur in painful tissues[3]. Regardless of potentially debilitating body pain, neither tissue damage nor deformity develops[3].

FM can be viewed as a condition composed of cardinal features significant for diagnoses, such as diffuse pain and widespread tenderness over distinct anatomical sites known as Fibrositic tender points (FTPs)[2]. Ancillary manifestations are of two varieties: (a) those which can be considered almost characteristic as they are found in three-quarters of individuals, including stiffness, fatigue, and nonrestorative sleep, and (b) those which are infrequent, existing in perhaps one-fourth of FM patients, such as IBS, Raynaud's like symptoms, headaches, paraesthesias, swelling and marked functional disability[2].

Despite being the most prevalent musculoskeletal pain disorder, FM is often misunderstood with other similar chronic pain conditions. In 1990, the American College of Rheumatology published the classification criteria of FM[4]. It was not initially meant as diagnostic criteria but has been used for this purpose i.e. FM is the presence of 11 out of 18 specific tender points involving both sides of the body that must be tender on palpation, including the occiput, low cervical, trapezius, supraspinatus, second rib, lateral epicondyle, gluteal, greater trochanter and knee joint. Other typical clinical findings, such as joint tenderness and decreased ROM of the neck, as well as other joints secondary to pain, paresthesia, and hyperalgesia, may also be noted on examination[4-5]. In FM, elevated C-reactive protein (CRP) levels are typical and contribute to widespread hyperalgesia. In association with BMI, compared to an obese FM patient, a lower-weight patient exhibits considerably lower levels of interleukin-6 and CRP levels, as well as less depressed symptoms, higher sleep quality ratings, and fewer tender points[5].

In the global population, FM affects approximately 2.7% of people[6,] oscillating from 9.3%, highest in an African country, Tunisia[6] and lowest, 0.2% in the American country Venezuela[7]. Some articles on the prevalence of FM were reported in Asia. Among the Chinese population, the estimated rate of FM was about 0.82%, while in Iran, a study reported the prevalence was about 2.31%, which was conducted in urban areas of Zahedan-Iran. A study by Joshi and Chopra in the Pune region, India, estimated the rate of FM at 8.8%. In Pakistani adult populations in the north,

Farooqi and Gibson found that major rheumatic diseases are more prevalent than elsewhere in the country; the overall estimated rate of FM was about 2.1% [8-11]. Based on gender differences, with a 3:1 ratio of females to males, FM is more prevalent among women[6].

Several studies indicate that FM patients are usually obese. However, according to the available studies, only 40 to 50% of FM patients are obese, while 21 to 28% are overweight[12-13]. Obesity is not uncommon in patients with FM, and BMI is significantly related to pain perception, anxiety, depression and disability. Therefore, this study aimed to investigate the association between BMI and pain perception, anxiety, depression, and disability in FM patients of Karachi. The purpose of conducting this study is that, as of now, no study has been conducted to cover this objective in the population of Karachi to determine whether FM patients are more prone to developing anxiety or depression.

Methodology

A total of 150 FM patients between the ages of 18 to 65 years from Jinnah Postgraduate Medical Centre, Karachi, Pakistan and other private clinical setups, including the Rabia Moon Memorial Institute of Neurosciences Trust, Baqai University Hospital, were enrolled in this cross-sectional survey using a convenience sampling technique. The study design was cross-sectional. All participants were initially informed regarding the purpose of the study, and then written consent was obtained from them. Afterwards, participants were asked to fill out a self-designed proforma regarding their demographics.

The data regarding demographic description includes the patient's age, gender, weight and height. Furthermore, the BMI of each participant was calculated using the formula:

weight in kilograms (kg) divided by height in meters (m) squared

The participants were classified into average weight, overweight, and obese categories. In addition, self-administered questionnaires, including Numeric Pain Rating Scale (NPRS), HAM-A (Hamilton Anxiety Rating Scale), HAM-D (Hamilton Depression Rating Scale) and Health Assessment Questionnaire Disability Index (HAD-QI) were used to assess and evaluate the perception of pain, level of anxiety, depression, and disability. These four standard questionnaires have been widely used in previous studies and have proven valid and reliable[14-17].

- The ***NPRS*** is a unidimensional measure that indicates the severity of pain level on an 11-point scale, with 0 representing "no pain" and 10 representing "worst pain"14.

- The ***HAM-A*** is one of the first rating scales developed for assessing anxiety symptoms; it is still widely used in clinical and research settings15. The questionnaire contains 14 symptom-defined elements, including psychological and somatic symptoms. The items are scored on a numeric scale from 0 (not present) to 4 (severe). A score of >17/56

indicates mild anxiety; 25-30 indicates moderate-severe anxiety. The ***HAM-D*** is a 17-item scale that relates to symptoms of depression experienced over the last week16.

- The ***HAQ-DI*** is a self-report measure of functional status (disability) that consists of eight sections: dressing, arising, eating, walking, hygiene, reach, grip, and activities. It has been used for various diseases, including rheumatoid arthritis, osteoarthritis, Fibromyalgia, scleroderma, and ankylosing spondylitis[17].

Patients with psychiatric disorders, malignancy, polyneuropathy, long-term inflammatory conditions, infections (acute or chronic), gestation, and any medical condition that could affect the assessment`s reliability were excluded.

Statistical Analysis

For descriptive Analysis, the mean and standard deviation of the data were calculated using version 20 of SPSS, while determining the relationship between the variables was carried out using a one-way analysis of variance (One-way ANOVA) and a bivariate correlation at a 95% confidence interval (CI). The significance level was set to $p \leq 0.05$.

Ethical Considerations

This study maintained data confidentiality throughout the research process. A written consent form was provided to all research subjects before enrollment, and they were informed of the study's purpose. Furthermore, the authors thoroughly answered all questions, and participants could refuse to participate if they no longer wanted to participate in the survey.

Results

Of the n=150 FM patients enrolled, 132 (88%) were females and only 18 (12%) were males. The FM patients' mean height, weight and age were 5.19±0.37 inches, 69.19±14.8 kgs and 42.44± 11.3 years, respectively. In addition to that, participants body mass index revealed that 50 (33%) patients were average, 58 (39%) were overweight, and 42 (28%) were obese (Table-1).

Table-1 Descriptive Statistics of Pain, Anxiety, Depression and Disability Scores of Patients

Outcomes		n	Mean±SD	Std. Error	Minimum	Maximum
Pain Scores	Normal	50	6.13±1.5	.22396	2.33	9.67
	Overweight	58	6.27±1.4	.19247	2.67	8.67
	Obese	42	6.06±1.8	.29212	1.67	9.33
	Total	150	6.16±1.6	.13269	1.67	9.67
Anxiety Scores	Normal	50	28.2±9.1	1.293	6	45

	Overweight	58	29.6±10.4	1.368	8	53
	Obese	42	32.8±9.5	1.475	14	56
	Total	150	30±9.8	.806	6	56
Depression Scores	**Normal**	50	18.1±7.2	1.030	2	35
	Overweight	58	20.2±7.1	.939	7	36
	Obese	42	19.6±7.2	1.120	3	37
	Total	150	19.4±7.2	.591	2	37
Disability Index Scores	**Normal**	50	0.94±0.69	.0985	.0	2.6
	Overweight	58	0.95±0.6	.0836	.0	2.4
	Obese	42	1.13±0.7	.1090	.0	2.9
	Total	**150**	**1±0.6**	**.0553**	**.0**	**2.9**

The association between BMI and level of pain, anxiety, depression and disability were determined in Figure-1.

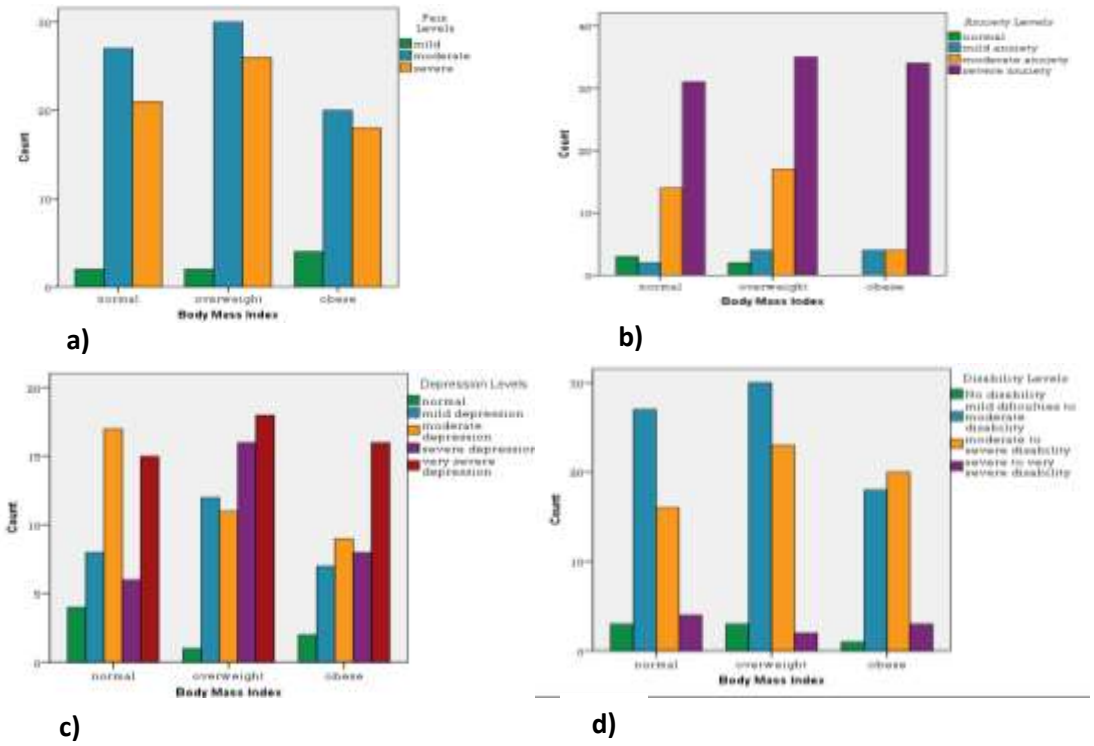

Figure-1 shows Association of BMI with a) Pain; b) Anxiety; c) Depression; and d) Disability Levels

The Table-2 and 3 displays the correlation between the BMI scores and the pain, anxiety, depression and disability scores of patients. It has been observed that only anxiety among FM patients has a positive weak correlation with the BMI of patients. The other factors do not have any significant relationship with patients' BMI.

Table-2 Correlation of BMI Scores with Pain, Anxiety, Depression and Disability using ANOVA

Outcomes		Sum of Squares	df	Mean Square	F	Sig.
Pain Scores	Between Groups	1.193	2	.597	.224	.800
	Within Groups	392.306	147	2.669		
	Total	393.499	149			
Anxiety Scores	Between Groups	498.162	2	249.081	2.610	.077
	Within Groups	14026.878	147	95.421		
	Total	14525.040	149			
Depression Scores	Between Groups	126.660	2	63.330	1.213	.300
	Within Groups	7673.713	147	52.202		
	Total	7800.373	149			
Disability Index Scores	Between Groups	1.028	2	.514	1.122	.329
	Within Groups	67.342	147	.458		
	Total	68.370	149			

Table-1 Correlation between Body Mass Index and Pain, Anxiety, Depression and Disability Scores of patients

Variable		Pain Scores	Anxiety Scores	Depression Scores	Disability Index Scores
Body Mass Index	Pearson Correlation	.011	.195*	.048	.072
	Sig. (2-tailed)	.897	.017	.562	.383
	N	150	150	150	150

Discussion

The study findings revealed that anxiety levels among FM patients have a positive correlation with their BMI, although the correlation is weak. This indicates that BMI influences the anxiety levels of these patients. As the BMI of patient increases, anxiety levels are likely to increase as well. Nevertheless, it was revealed that the other variables evaluated in the study, including the pain intensity, level of depression and disability, did not exhibit any significant relationship with FM patients' BMI. This indicates that the severity of pain, levels of depression and disability a FM patient suffers from is not affected by his/her BMI. Thus, no significant association was found between BMI and these variables however only a positive weak correlation with anxiety is reported in our study.

In comparison to the previous studies, our results align with the Correa-Rodríguez et al.[18] findings, which reported a lack of relationships between pain score and anxiety in association with BMI. Similar findings have also been reported by Yunus et al.[19] where associations between BMI and anxiety were not statistically significant in a cohort of female patients with FMS. Another study conducted by Gota and Wilke[20] reported no significant association between pain scores and among all three BMI categories of FM patients, similar to our study findings. However, our study diverges from Kim et al.[21] and Timmerman, Calfa, and Stuifbergen[22] findings, demonstrating a positive correlation between BMI and pain. Similarly, Koçyiğit and Okyay[1] findings also reported a significant association between BMI and level of pain and a positive correlation between BMI and depression and interestingly, no notable relationship was found between BMI and anxiety among FM patients. Our study findings reported that standard weight, overweight and obese groups of FM patients all had equally mild to moderate levels of disabilities, which suggested that BMI does not influence the level of disability. However, previously, a study conducted by Capodaglio and Liuzzi[23] reported that obesity has a profound relationship with disability, which is incongruent with our study findings.

Several rationales may account for the inconsistencies in the results. There may have been a role for sample size and ethnicity in these variations. In addition to BMI, medication use, physical activity, co-morbidities, duration of disease, and education level, patients' characteristics may also influence the results. Although no statistical significance was found among all categories of factors, the present findings have important clinical implications. The level of pain and anxiety was found to be equally severe among all three categories; however, depression and disability were higher in those overweight and obese groups. Hence, BMI influences the symptoms of FM clinically. When taken into consideration from a clinical perspective, behavioural weight reduction programs with dietary modification and exercise that include aerobics and strength training may improve FM symptoms and overall quality of life, especially for overweight and

obese patients with FM. Our study has some methodological flaws, including the small sample size and inappropriate gender ratio (9:1), which may limit its generalizability. Additionally, relying solely on BMI to measure obesity may overlook other critical anthropometric factors, such as waist circumference and body fat percentage. Thus, future studies should address these shortcomings by encompassing a larger sample size, a control group without FM, and a more comprehensive range of anthropometric measurements to strengthen the validity of findings.

Conclusion

Our study reveals no significant association between BMI and pain perception, depression and disability, however a weak positive correlation with anxiety was observed. It has been concluded that BMI is not a significant predictor of pain, anxiety, depression and disability in FM patients.

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Conflict of Interest

None.

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None.

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AUTHORS' CONTRIBUTION

The following authors have made substantial contributions to the manuscript as under:

Conception or Design: Rani S, Ahmed H, Khan S

Acquisition, Analysis or Interpretation of Data: Rani S, Ahmed H, Khan S

Manuscript Writing & Approval: Rani S, Ahmed H, Khan S, Amir M

All the authors agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.