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General Surgery

OBESITY & MUSCULOSKELETAL PAIN

Dr. Prof. S. Sree Ranjini — Professor and Head, Dept. Of Anaesthesiology & Pain Medicine, Bhaarath Medical College Hospital, Chennai

Dr. N. Sudhakar* — Assistant Professor, Dept. Of Gen. Surgery, Bhaarath Medical College Hospital, Chennai. *Corresponding Author

ABSTRACT

Introduction: Obesity is a global epidemic. It is being increasingly recognized that obese people, in addition to experiencing considerable metabolic co morbidities, also have musculoskeletal pain. Musculoskeletal pain is a well-established cause of general disability.

Aim Of Our Study:

- To assess bodyweight as a risk factor for chronic musculoskeletal painful conditions
- To assess effects of weight reduction on pain outcomes

Methods: The study population included 1032 eligible patients between 18 – 90 yrs, of either gender, who presented to our hospital with complaints of musculoskeletal pain, over a period of one year. Musculoskeletal pain was assessed by a written questionnaire. Height, weight and Body mass index (BMI) calculated. The data subjected to statistical analysis.

Results: With increases in BMI over the normal range, more number of patients had statistically significant chronic pain and pain involving multiple regions. Gender wise, more number of females had higher BMI compared to males, had more chronic pain and a higher average duration of pain. Low Back ache and knee pain were among the commonest complaints in all pain groups. Exercise and loss of weight had a favourable outcome on pain.

Discussion: Obese people have been noted to have higher levels of biomarkers of inflammation and exhibit a variety of biomechanical changes which makes them prone to chronic pain. Chronic pain leads to impaired health related quality of life.

Conclusion: There is a definite relationship between increasing weight and musculoskeletal pain. Hence Weight management should be considered as an adjunct in the treatment of musculoskeletal pain for a favourable outcome.

KEYWORDS : Obesity, overweight, musculoskeletal pain, knee pain, back pain

INTRODUCTION:

Globally, the prevalence of obesity is increasing dramatically to epidemic proportions. The World Health Organization (WHO) reports that currently more than 1 billion people worldwide are overweight and 300 million meet the criteria for obesity (1). By 2030, if current patterns persist, 58% of the world's population is expected to be obese or overweight (2). WHO identified the burden of non-communicable diseases, such as cardiovascular disease, hypertension, diabetes, cancers, stroke and obesity-related conditions, as accounting for 60% of global deaths (1).

It has been recognized that obese people, experience considerable metabolic comorbidities, but there is little awareness that the obese also suffer from chronic musculoskeletal pain, more than individuals with a normal body weight. It also seems that obese individuals even if otherwise healthy, suffer from pain much more than thin individuals. Obesity contributes substantially to the burden of chronic medical conditions which place a high economic burden on the health care systems (3) and musculoskeletal pain is a well-established cause of general disability.(4,5)

AIM OF OUR STUDY:

- To assess bodyweight as a risk factor for chronic musculoskeletal painful conditions
- To assess effects of weight reduction on pain outcomes

We hypothesized that musculoskeletal pain is common in obese individuals and that a greater severity of obesity is associated with a greater likelihood of having pain. Loss of weight may have a beneficial effect on pain outcome.

MATERIALS AND METHODS:

This retrospective study was conducted in 1032 eligible patients in age group 18 – 90 yrs, of either gender, who presented to the pain clinic in our hospital with complaints of musculoskeletal pain, over a period of one year (February 2019 – January 2020). They were divided in to two groups, Acute pain group and Chronic pain group.

Inclusion Criteria:

Age18 – 90 years, ASA – PS classification I and II, with complaints of musculoskeletal pain.

Exclusion Criteria:

ASA class III and above, rheumatoid or psoriatic arthritis, history of injury to the painful part, patients with psychiatric disorders on anti-psychotic drugs.

Musculoskeletal pain was assessed by a written questionnaire. The areas of pain, duration, intensity, radiation, aggravating & relieving factors of pain noted. Pain that lasted less than 6 months was considered as acute and that which lasted more than 6 months was considered chronic. Anthropometric measurements Height, weight and Body mass index calculated. A wall mounted stadiometer was used to measure Height to the nearest 1 mm and weight was measured to the nearest 0.1 kg using a balance scale. Body mass index (BMI) was calculated as the weight in kilograms divided by the height in meters squared. For defining the normal, overweight and obese body mass index (BMI), we used cut off points recommended by the World Health Organization (6, 7).

Along with the treatment, patients were motivated to bring lifestyle modifications which included changes in diet, behaviour and incorporating daily exercise of any form – walking, yoga, gym … anything that is suitable and feasible for them. There were then followed up over phone at intervals and their report documented.

Statistical Methods

The data was subjected to statistical analysis. In our study, data was analysed as follows. The No. of patients who had acute Pain and chronic pain were noted. The average age, duration, gender distribution and weight statistics were analysed. If patient complained of pain in more than one area, it was termed multiple and analysed accordingly. Subject characteristics were described using means and proportions. Categorical variables were analysed using chi-square tests at 95% confidence intervals. The *t*-tests were used for continuous variables. We estimated odds ratios for the prevalence of musculoskeletal pain, using logistic regression, for increases in weight and BMI.

Table 1: Comparison Of Patients With Acute Vs Chronic Pain

		Acute Pain	Chronic pain	'p' value
No. of patients		11.82% (122)	88.18% (910)	<0.0001
Average Age		46.75	51.32	<0.0001
Gender distribution	Male	58.19% (71 M)	49.67% (452 M)	0.0773

	Female	41.80% (51 F)	50.33% (458 F)	0.0773
Single region of pain		93.44% (114/122)	68.24% (621/910)	<0.0001
Multiple regions of pain		6.56% (8/122)	31.76% (289/910)	<0.0001
Normal weight (BMI 18.5 to 24.9)		43.44% (53)	27.69% (252)	0.0003
Weight ≥ 25		56.56% (69)	72.31% (658)	0.0003
Overweight (BMI 25.0 to 29.9)		37.70% (46)	44.29% (403)	0.1682
Obese Class I (BMI 30.0 to 34.9)		13.94% (17)	18.02% (164)	0.2649
Obese Class II (BMI 35 to 39.9)		3.28% (4)	8.13%(74)	0.0571
Obese Class III Morbid obesity (BMI of over 40)		1.64% (2)	1.87%(17)	0.8593

'p' value of < 0.05 is significant

Table 2: Comparison Of Patients With Acute Vs Chronic Pain – Gender Distribution

	ACUTE PAIN (122)			CHRONIC PAIN (910)		
	Male	**Female**	**'p' value**	**Male**	**Female**	**'p' value**
No. of patients	58.2% (71)	41.8% (51)	0.0106	49.67% (452)	50.33% (458)	0.7816
Average Age in years	48.41	45.08	< 0.0001	51.51	51.14	< 0.0001
Single region of pain	56.55% (69)	36.89% (45)	0.0021	32.86% (299)	35.38% (322)	0.2551
Multiple regions of pain	1.64% (2)	4.92% (6)	0.1506	16.81% (153)	14.95% (136)	0.2752
Average duration of pain in years	0.1075 (1.29 months)	0.27 (3.24 months)	0.2056	2.84	3.45	< 0.0001
Normal weight (BMI 18.5 to 24.9)	31.98% (39)	11.48% (14)	0.0001	16.38% (149)	11.32% (103)	0.4015
Weight ≥ 25	68.02% (32)	88.52% (37)	0.0086	67.04% (303)	77.51% (355)	0.0004
Overweight (BMI 25.0 to 29.9)	19.68% (24)	18.04% (22)	0.7438	23.85% (217)	20.42% (186)	0.0781
Obese Class I (BMI 30.0 to 34.9)	3.27% (4)	10.66% (13)	0.0237	7.92% (72)	10.11% (92)	0.1030
Obese Class II (BMI 35 to 39.9)	1.63% (2)	1.63% (2)	1.0000	1.32% (12)	6.82% (62)	< 0.0001
Obese Class III - morbid obesity (BMI of over 40)	1.63% (2)	0	0.1576	0.21% (2)	1.65% (15) (1 patient BMI over 50).	0.0014
Knee Pain	25.35% (18)	17.65% (9)	0.3142	26.77% (121)	34.72% (159)	0.0094
Low Back pain	26.76% (19)	23.53% (12)	0.6873	36.73% (166)	24.02% (110)	< 0.0001

'p' value of < 0.05 is significant

RESULTS:

Of all the people who visited the pain clinic over a period of 1 year, 1032 eligible patients were selected for the study. Of this 122 (11.82%) patients had acute pain (pain less than 6 months) and 910 (88.18%) had chronic pain (pain more than 6 months) while the average age of patients in acute pain group was 46.75 years and that of chronic pain group was 51.32 years; both of which were statistically significant. The average duration of pain was 2.27 months (0.1892 years) in the Acute Pain group and 3.15 years in the Chronic Pain group. The gender distribution between the acute pain group and chronic pain group was not statistically significant. Comparing the Region of pain distribution, it was confined to a single region in 93.44% in acute pain group and only 68.24% in Chronic pain group; similarly pain was in multiple regions in 31.76% in chronic pain group compared to a mere 6.56% in acute pain group which was statistically highly significant. More patients in acute pain group (43.44%) had normal weight compared to chronic pain group (only 27.69%) and this was statistically significant. The patients in overweight, obese class I and class III groups were more or less equal, among the acute and chronic pain groups whereas there was a statistically significant difference in obese class II patients with more numbers (8.13%) in chronic pain group compared to acute pain group (3.28%).

Comparing the gender differences in the acute pain group the number of males were 58.2% compared to females at 41.8%; the average age in years was slightly higher in the males at 48.41% compared to 45.08% in females and more number of males in the acute pain group (56.55%) had pain in a single region compared to females (36.89%) and all these were statistically significant. Pain in multiple regions and average duration of pain was only slightly different between the genders and not statistically significant. More number of males (31.98%) had a normal BMI compared to females (11.48%) and 88.52% females had BMI equal to or more than 25, compared to 68.02% males; all being statistically significant. Comparison of overweight and obese classes among males and females in acute pain group yielded no statistically significant findings.

Comparing the gender differences in the chronic pain group, there was no statistically significant difference in the number of male and female patients and region of pain being single or multiple. The average age in years was slightly higher in males at 51.51 years compared to females at 51.14 years; but the average duration of pain was higher in females at 3.45 years compared to males at 2.84 years and both these parameters were statistically significant. There was no statistically significant gender difference in normal BMI category, overweight and obese class I patients. But altogether more number of females (77.51%) had BMI equal to or more than 25 compared to males (67.04%) and this was statistically significant. Statistically significant was 6.82% and 1.65% of females were in obese class II and III respectively compared to only 1.32% and 0.21% of males respectively. Estimation of odds ratios for the prevalence of musculoskeletal pain using logistic regression, for increases in weight and BMI, showed a strong relationship between the two and was highly significant.

The patients came with complaints of pain in various regions such as knee, low back, neck, headache, heel pain, trigger points, arm, forearm etc. Of these, knee pain and low back ache were predominant. In the acute pain group, the gender differences between the number of patients with knee and low back ache were statistically insignificant; whereas the same was statistically significant in the chronic pain group. More women in the chronic pain group had knee pain (34.72%) as compared to men (26.77%) and more men (36.73%) had low back ache compared to women (24.02%). Knee Pain and back ache put together, either as sole or one among many complaints alone contributed to 52.11% and 41.18% of pain in males and females respectively in acute pain group. Similarly, they contributed to 63.50% in males and 58.74% in females in chronic pain group.

Overall, a synopsis of the results were that; among all eligible patients who visited our pain clinic more number of patients complained of chronic pain. With increases in BMI over the normal range, more number of patients had statistically significant chronic pain and pain involving multiple regions. Gender wise, more number of females had higher BMI compared to males, had more chronic pain, at younger ages and with a higher average duration of pain. Low Back ache and knee pain were among the commonest complaints in all pain groups.

DISCUSSION

Overweight and obesity being the harbinger of metabolic diseases is a

well-known fact, but lesser known is its relation to musculoskeletal pain. We wanted to assess if increase in bodyweight over the normal was a risk factor for chronic musculoskeletal painful conditions and if weight reduction has a beneficial effect on pain outcomes.

The most accurate measures of body fat (the major component of body weight responsible for adverse outcomes) such as underwater weighing, dual-energy x-ray absorptiometry (DEXA) scanning, computed tomograpy (CT), and magnetic resonance imaging (MRI) are impractical for use in everyday clinical encounters; while estimates of body fat including body mass index have limitations compared to these imaging methods, but still provide relevant information and are easily implemented in a variety of practice settings. The National Institutes of Health and also the World Health Organization endorse the use of body mass index (BMI) (kilogram per square meter) to define overweight as BMI ≥25 kg/m2 and obesity as BMI ≥30 kg/m2 [8, 9, 10], ≥95th percentile for age and gender matched norms (11,12). We choose to use body mass index (BMI) as a parameter to define obesity in our patients.

Classification of weight as per BMI (8,12) is as follows: Normal weight is BMI of 18.5 to 24.9; Overweight is BMI of 25.0 to 29.9; Obese Class I is BMI of 30.0 to 34.9; Obese Class II is BMI of 35 to 39.9 and Obese Class III—morbid obesity—is BMI of ≥40. This above classification is based on epidemiological evidence linking increasing weight to increasing risk of weight-related comorbidities and premature mortality [9]. Evidence that in addition to metabolic co morbidities, overweight and obesity may be related to musculoskeletal pain is seen in research by Peltoneon et al and Anderson et al which has revealed that in adults, obesity has also been associated with musculoskeletal pain (13,14), similar to the results of our study. Even the younger age group is affected as seen in a study by Schwimmer, which has demonstrated impaired quality of life in obese children and adolescents (15).

Our patients presented with pain in various regions such as knee, low back, head, neck, heel, leg, carpal tunnel syndrome, fibromyalgia etc. Of all these knee pain due to osteoarthritis and low back pain was most predominant. This is similar to previous studies (14,16,17,18).

OsteoArthritis (OA) knee is a progressive, non-reversible condition clinically characterized by joint pain, tenderness and limitation of movement. Obesity has been shown to be strongly associated with knee OsteoArthritis (OA) across race/ethnicity and sex [19]. The two major risk factors for developing osteoarthritis are obesity and being female (19). Likewise in our study too, more number of obese women (34.72%) had knee pain compared to obese men (26.77%). According to studies (20,21), even slight levels of increasing weight carry an increased risk of knee OA, with overweight patients having a 2.2 fold increased risk factor for developing knee osteoarthritis when compared with their normal weight counterparts. Factors for developing OA knee with increasing weight are many such as serious postural changes that affect loading on individual joints (22), joint misalignment (23) and higher levels of biomarkers of inflammation causing pain (24).

The next predominant painful condition seen in our patient population was low back pain. Disabling low back pain (LBP) was defined as recurrent or continuous low back pain of a moderate to severe degree or low back pain with functional impairment (25). Risk factors for the presence and severity of LBP include both socio demographic factors, such as age, as well as lifestyle factors, such as smoking and physical conditioning (26). Studies (14, 27) suggest that individuals with BMI <30 are at minimal risk of developing LBP, those between 30 and 40 are at moderate risk, and patients with BMI >40 are at high risk. Comparing the gender differences in our patient population, males had a higher incidence of low back pain in both acute and chronic pain groups. Perhaps this can be attributed to the predominantly sedentary work habit (a desk job) of the males in our population subset. This is in contrast to a study by Janke et al (28) whose findings suggest that the association between overweight or obesity and the prevalence of low back pain is stronger for women than for men. The cause for back pain in the overweight and obese could be due to increased mechanical load on the spine, disc degeneration and chronic inflammation as various inflammatory markers such as Tumor necrosis factor, interleukin-6, and C-reactive protein are all factors secreted by adipose tissue (29, 30).

Other painful conditions such as fibromyalgia, headaches, carpal tunnel syndrome etc are also associated with obesity as seen by various studies (31,32,33) and weight loss is said to improve the condition. Women in general seem to be more sensitive to pain. The gender-related differences in the association of overweight or obesity with pain could be due to hormone-related obesity and associated changes in pain sensitivity (34).

Obesity can lead to a vicious cycle. Obesity causes pain, pain leads to movement restriction, consequently a sedentary life, which in turn causes obesity and the cycle, continues. By adopting a healthy lifestyle in terms of diet and exercise, this cycle can be broken, paving the way for good health related quality of life (HRQOL). On the individual level, HRQOL includes physical and mental health perceptions (e.g., energy level, mood) and their correlates—including health risks and conditions, functional status, social support, and socioeconomic status (35, 36). Studies have shown that weight loss will be of immense benefit in decreasing musculoskeletal pain and improving HRQOL (37,38) and this is seen after bariatric surgery too (13, 39). The American College of Rheumatology in its Knee Osteoarthritis treatment guidelines recommend weight loss for overweight persons [40]. Over weight and obesity is also associated with psychological depression (41) and weight loss improves the person's self-esteem and decreases depression (42). In view of all the above, calculation of the BMI should become a routine part of the screening evaluation for chronic pain patients, with additional screening for disability and psychologic distress in patients with elevated BMIs (43).

Regarding favorable pain outcomes seen in our study, decrease in pain in our patients could be due to the multimodal approach of treatment which included medications, physiotherapy, life style changes and the interventional pain procedures when warranted. Though patients were motivated to adopt a healthier lifestyle which included diet, exercise, behavior modification, and some did take it up in earnest; a favorable pain outcome could not be solely attributed to exercise or weight loss as this requires a long term follow up and exceeds our period of study. Nevertheless, the patients who started a regular exercise and diet regimen reported a general sense of wellbeing and decrease in pain intensity, irrespective of the number of kilos of weight shed.

CONCLUSION:

Overweight / obesity are a serious public health concern. In addition to its role in causation of non-communicable diseases; weight above normal range is associated with increased incidence of musculoskeletal pain. Weight reduction enhances the likelihood of positive outcomes and hence weight management should be considered routinely as an adjunct in the treatment of musculoskeletal pain for a favourable outcome.

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