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RESEARCH

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Efficacy of monoclonal antibodies against CGRP in migraine patients with fibromyalgia comorbidity: a retrospective monocentric observational study

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Abstract

Background Migraine is a common comorbidity with fibromyalgia (FM). CGRP is a potent inflammatory neuropeptide that may play a role in somatic and visceral pain either inflammatory or neuropathic. Previous studies have reported a significant number of migraine patients with FM responding to anti-CGRP therapies. The potential impact on diffuse pain and global disability associated with fibromyalgia is still unclear.

In this retrospective, observational, cross-sectional study, we aimed to analyze the effects of a monoclonal antibody therapy in a subpopulation of migraineurs with FM compared to patients without this comorbidity by assessing the headache frequency and disability as well as the severity of FM (assessed by the Fibromyalgia Impact Questionnaire (FIQ).

Methods Among 1088 patients came for the first visit to our headache Center between January 1, 2021, and December 31, 2022, we examined six-month outcomes of 148 migraine patients prescribed various monoclonal antibodies to CGRP, erenumab, galcanezumab, and fremanezumab. One hundred and twenty-two patients were selected, 26 of whom suffered from FM.

We retrospectively evaluated the following characteristics at baseline (T0) and after 6 months (T1),headache frequency and severity, number of days with symptomatic medication, and MIDAS score. In the FM patients, we evaluated the FIQ and the intensity of somatic pain using a numerical rating scale from 0 to 10.

Results Headache characteristics improved similarly in patients with and without FM comorbidity. The number of patients in whom headache frequency decreased by at least 50% was similar in the two migraine groups. In patients with FM, both fibromyalgia-related disability and somatic pain improved.

The improvement in fibromyalgia disability was significantly correlated with the improvement in migraine-related disability.

Conclusions We found that in migraine suffereres with FM, anti-CGRP monoclonal antibodies had a similar beneficial effect on migraine as in non-fibromyalgia patients, in addition to reducing somatic pain and global disability from the disease. The anti-CGRP agents, represent a good option for the treatment of migraineurs with fibromyalgia, for which no resolutive therapy is yet available.

Keywords Migraine, Fibromyalgia, CGRP, Monoclonal antibodies, Fibromyalgia disability, Headache features

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Introduction

Migraine is a disabling disease of neurovascular origin whose preventive therapeutic approach is primarily aimed at reducing the frequency and intensity of attacks and using symptomatic medication,, improving quality of life. In recent years, the role of a neuropeptide called Calcitonin Gene Related Peptide—CGRP—has emerged as a primary target to prevent activation of the trigeminovascular system and the development of sterile inflammation, headache and peripheral and central sensitization phenomena [1].

Monoclonal antibodies directed against CGRP or its receptors have been introduced as preventive migraine therapies for 5 years, with optimal results in terms of efficacy, tolerability and safety [2].

Fibromyalgia (FM) is a disabling disorder characterized by diffuse pain, fatigue, sleep disturbances, and cognitive fog. In defining the diagnostic criteria, the American College of Rheumatoloy-ACR- has established headache as an associated factor supporting the diagnosis [3]. Migraine is a common comorbidity with FM and patients with fibromyalgia are frequently affected by chronic and disabling forms of headache [4]. At present, there is little evidence of pharmacological treatment for fibromyalgia. Due to the lack of therapies that address the complex pathophysiologic basis of the disease, a non-pharmacologic approach is primarily recommended [5, 6]. CGRP is a potent inflammatory neuropeptide that may play a role in somatic and visceral inflammatory and neuropathic pain [7]. A recent review of clinical trials on the effects of a monoclonal antibody to CGRP, galcanzezumab, in migraine demonstrated the results of 12 months of therapy in 101 patients affected by fibromyagia who were originally excluded from the analysis [8]. The authors found a positive result in these patients and concluded that even in this subgroup, 30–75% of patients responded to therapy without serious adverse effects [8]. However, the analysis did not address potential effects on diffuse pain and global disability associated with fibromyalgia.

In this retrospective observational cross sectional study, we aimed to analyze the effects of 6 months of monoclonal antibody therapy in a subpopulation of migraine patients with FM comorbidity compared to non-comorbid patients, assessing the frequency of headaches and associated disability, as well as the severity of FM, as assessed by the Fibromyalgia Impact Questionnaire (FIQ) [9].

Subjects

In patients who accessed the Headache Center of the Neurophysiopathology Unit between 1 january 2021 to 31 december 2022, we reviewed the six-month outcomes of migraine patients treated with different monoclonal antibodies to CGRP, erenumab, galcanezumab and fremanezumab, according to the latest International Headache Society criteria [10].

Of the 1088 patients who visited our center for the first time, we prescribed monoclonal antibodies against CGRP to a total of 175 patients. Of the 148 patients who received the prescription within June 2022, 122 completed the six-month study within December 2022. Twenty patients did not return for follow-up and 6 patients discontinued treatment after 3 months because the MIDAS score had not reduced by at least 50%, as required by national regulations for reimbursement. Of the 148 patients treated with monoclonal antibodies, 44 were affected by fibromyalgia according to the 2016 ACR criteria [3] and 26 completed the study as 18 did not continue treatment, 4 discontinued treatment after 3 months due to ineffectiveness and 14 did not continue treatment for personal reasons (difficulty to come to our center for regular check-ups for various problems). According to Italian drug reimbursement rules, only patients with high-frequency drug-resistant migraine with at least 8 headache days/month in the last 3 months and unsuccessful use of antiepileptic drugs, beta-blockers, antidepressants and/or botulinum toxin CGRP monoclonal antibodies could be prescribed (Fig. 1).

The selection criteria for treatment with monoclonal antibodies were therefore: migraine diagnosis according to the current criteria [10] (migraine with aura, without aura or chronic migraine), 8 days or more with migraine/month in the last 3 months, according to headache diary, esistance to at least three preventive drugs, including botulinum toxin for chronic migraine or not.

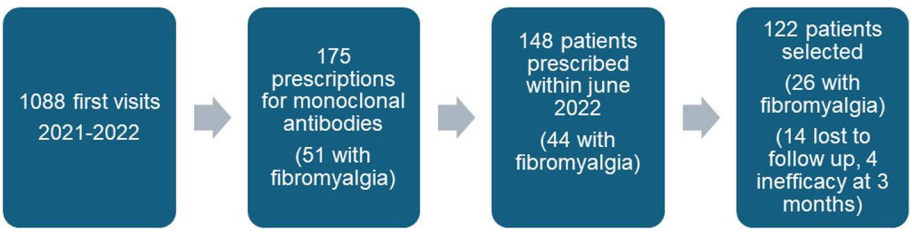

Fig. 1 Flow chart reporting patients' selection

All patients treated with CGRP monoclonal antibodies are asked to record headache characteristics in a headache diary. In accord with our routine clinical practice, we assessed the following characteristics at baseline (T0) and after 6 months (T1): headache frequency, number of days on symptomatic medication, headache intensity assessed with a numerical rating scale from 0 to 10, calculated as the average value of days and intensity of a single attack in the last 3 months using a headache diary (Headache Numerical Rating Scale HNRS). The MIDAS score was also taken into account [11]. In FM patients, we assessed the FIQ [9] and the intensity of somatic pain using a numerical rating scale from 0 to 10 (Somatic Numerical Rating Scale SNRS). The FIQ score includes several items to assess the main features of the disease, such as disability associated with diffuse pain, fatigue, sleep problems and psychopathological symptoms. It is useful to measure the initial severity of FM and its changes under treatment [9] Patients were allowed to take preventive medication in addition to the anti-CGRP therapies. This was based on clinical judgment, particularly with regard to antidepressants, which are useful for possible concomitant symptoms of anxiety, depression and sleep disorders.

As the study was a retrospective observation, it was not submitted to the ethics committee as all assessment procedures were carried out as part of routine clinical practice. However, in accordance with the rules of our hospital and national regulations on data processing, all patients signed a consent form to allow the use of their anonymized data for observational research.

Statistical analysis

We have previously assessed the distribution of the data using the Shapiro-Wilks test. We previously evaluated the distribution of data, using the Shapiro Wilks test. To calculate the differences in the frequency of missed follow-up visits and medication ineffectiveness at 3 months between FM and non-FM migraine patients, we used the chi-square test.The most important confounding factor could be the different number of patients in the 2 groups considered, as only a few migraine patients had fibromyalgia comorbidity [4] However, this cannot be resolved in a real-life study. Repeated measures ANOVA was used to compare the main headache characteristics between T0 and T1, with FM vs. no FM group as a factor.

Student's t-test for paired data was applied to compare FIQ and pain intensity scores in FM patients between T0 and T1. The Pearson correlation test was applied to determine the relationship between the percentage change in headache frequency and MIDAS scores with the change in FIQ score.

The software Jamovi 2.3 Vers 28 and JMP pro Vers 18 were used.

Results

Demographic and clinical characteristics. The main demographic and clinical characteristics are shown in Table 1. The 2 groups were similar in terms of age, gender and number of chronic forms (Table 1). All patients had previously been treated with antiepileptic drugs (topiramate 75–100 mg for at least 3 months) and antidepressants (10–25 mg for at least 3 months)). 10 FM patients and 15 in the non-FM group had previously been treated with botulinum toxin without success for at least 6 months. Twenty non-FM patients and 6 FM patients had taken beta-blockers—propranolol or atenolol—while this was not indicated in the others for various reasons, such as cardiac contraindication, tendency to hypotension, asthma or comorbidity with depression. Thirty-two non-FM patients and 12 FM patients continued to take antidepressants—amitriptyline or duloxetine—during anti-CGRP treatment. The monoclonal antibodies were administered subcutaneously in monthly doses. In the FM group, 4 patients were treated with erenumab at a monthly dose of 140 mg, 12 patients with fremanezumab 225 mg, 10 patients with galcanezumab 120 mg, after an initial induction with 240 mg. In the group without FM, 20 patients were treated with erenumab, 25 with fremanezumab and 61 with galcanezumab, each at the same dose. The different monoclonal antibodies were evenly distributed between the 2 groups (Chi-square 4.09 p 0.25).

Consistent with previous studies [2], very few adverse events occurred in our population (only 2 patients in the groups without FM, 1 of whom was treated with fremanezumab and 1 with galcanezumab, had a mild transient local skin reaction to the injection, which disappeared on the second administration.

Two patients, 1 for the groups, had mild constipation with erenumab that resolved with diet.

Outcome of headache. We observed that 100% of patients without fibromyalgia returned for 6-month

Table 1 Demographic and clinical features in migraine patients with and without fibromyalgia (FM) comorbidity

	Age (years)	Sex	Type of migraine
FM	43.5 ± 8.9	1 m, 25 f	21 chronic, 5 episodic (8 with MOH)
No FM	44.1 ± 7.5	19 m, 77 f	30 chronic, 66 episodic (12 with MOH)
	Anova F 0.08 n.s	Chi square 3.8 p 0.051	Chi square 0.91 p 0.338

follow-up, while a relevant number of patients with FM comorbidity decided not to come for follow-up for various reasons (31.8% chi square 80.3 p 0.00001). The frequency of patients with medication ineffectiveness at 3 months did not differ significantly between FM and non-FM (chi-square with correction 2.44 p 0.11). No patient discontinued treatment due to adverse effects. Headache frequency and days of symptomatic medication use improved significantly after 6 months, with no significant differences between the FM and non-FM groups.This effect was present after 3 months of treatment, similarly in the 2 groups (headache frequency after 3 months 12.1 headache/days/months in FM group, 9.9 in not FM group-ANOVA FM vs no FM F 0.09 p 0.8).

Headache intensity also improved in all migraine patients, but the improvement was significantly lower in patients with FM comorbidity. Disability due to migraine improved similarly in the 2 groups (Table 2).

The number of patients in whom headache frequency decreased by at least 50% was similar in the 2 migraine groups (46.2% for FM, 54.2 for non-FM chi-square 0.52 p 0.46) (Fig. 2).

Considering the subgroups of patients with Chronic Migraine, percentage reduction of headache frequency was similar between FM and not FM patients (F 1.41 o 0.2).

Outcome of the fibromyalgia features. In patients with FM, fibromyalgia-related disability improved as measured by the FIQ (t-test 4.69 p 0.001; effect size 0.91). Somatic pain, as measured by the 0–10 numeric rating scale, also improved significantly (t-test 4.07 p 0.001; effect size 0.79) (Fig. 3).

We found that the improvement in fibromyalgia disability as measured by the FIQ was significantly correlated with the improvement in migraine-related disability as measured by MIDAS (Pearson correlation 0.55 p 0.0033). The relationship between the FIQ and the frequency of headaches showed a similar trend, but was not significant (Pearson correlation 0.34 p 0.08) (Fig. 4).

Episodic and chronic migraine patients with comorbidity for FM did not differ for percentage reduction of FIQ scores (ANOVA F 3.59 p 0.07).

Discussion

In this real-world, retrospective study of the efficacy of monoclonal antibodies in patients with migraine who have a comorbidity with fibromyalgia, we found that headache outcomes were generally positive in patients who completed six months of therapy and did not differ from outcomes observed in patients without a comorbidity.

Table 2 Mean, standard deviations and 95% C.I. of main headache features in migraine patients with and without fibromyalgia (FM) comorbidity. Standard deviations and 95% CI are reported in brackets

	Group	Mean (SD, *95% C.I.*)	Statistical analysis (ANOVA)
Headache frequency			
T0	FM	19.31 (7.70, *16.2- 22.4*)	T0 vs T1
	no FM	18.21 (7.37, *16.7–19.7*)	**F 96.6 p 0.001**
T1	FM	11.42 (8.14, *8.13- 14,7*)	T0 vs T1 x FM vs no FM
	no FM	9.81 (7.69, *8.23–11.4*)	F0.083 p 0.77
Days with rescue therapy			
T0	FM	17.62 (6.74, *14.9–20.3*)	T0 vs T1
	NoFM	17.02 (7.82, *15.4–18.6*)	**F 106 p 0.001**
T1	FM	9.73 (6.71,*7.02–12.04*)	T0 vs T1 x FM vs noFM
	no FM	7.94 (7.38, *6.42–9.45*)	F 0.42 p 0.48
Headache intensity			
T0	FM	8.88(1.31, *8.36–9.41*)	T0 vs T1
	no FM	9.29 (1.12,*9.06–9.52*)	**F 89.75 p 0.001**
T1	FM	7.46 (1.90, *6.69–8.23*)	T0 vs T1 x FM vs no FM
	no FM	6.97 (1.84,*6.59–7.34*)	**F 5.24 p 0.024**
MIDAS			
T0	FM	62.81(25.97,*52.3–73.3*)	T0 vs T1
	NoFM	58.73(30.11,*52.6–64.8*)	**F 65 p 0.001**
T1	FM	36.19(19.15,*28.5–43.9*)	T0 vs T1 x FM vs. noFM
	no FM	29.71(26.73,*24.2–35.2*)	F 0.1 p 0.74

Results of ANOVA for repeated measures are shown, with significant results reported in bold

Although our case series was significantly smaller compared to multicenter studies [8], the potential added value of the present data lies in the particular consideration of the diagnostic criteria and specific features of fibromyalgia compared to a general assessment of comorbidity. The diagnosis of fibromyalgia has evolved in recent years from the assessment of tender points as the primary criterion to a comprehensive consideration of the spread of pain and accompanying symptoms, including headache [3]. Headache has been recognized as a fundamental symptom for FM diagnosis and therefore plays an important role in the overall picture of FM, as do bladder dysfunction and depression [3]. While we observed a relevant reduction of headache frequency in FM patients and the same proportion of responders as compared to no FM migraine group, a considerable number of patients decided not to continue the monoclonal antibodies treatment, for reasons different from adverse reactions of lack of efficacy. In patients with fibromyalgia, adherence to treatment is usually low because they have a long history of pain that is unresponsive to multiple medications and often have psychiatric comorbidities and a personality profile that is less prone to trusting behavior [12, 13]. The lack of a specific cause of the disease, a sceptical attitude and the tendency of others to associate

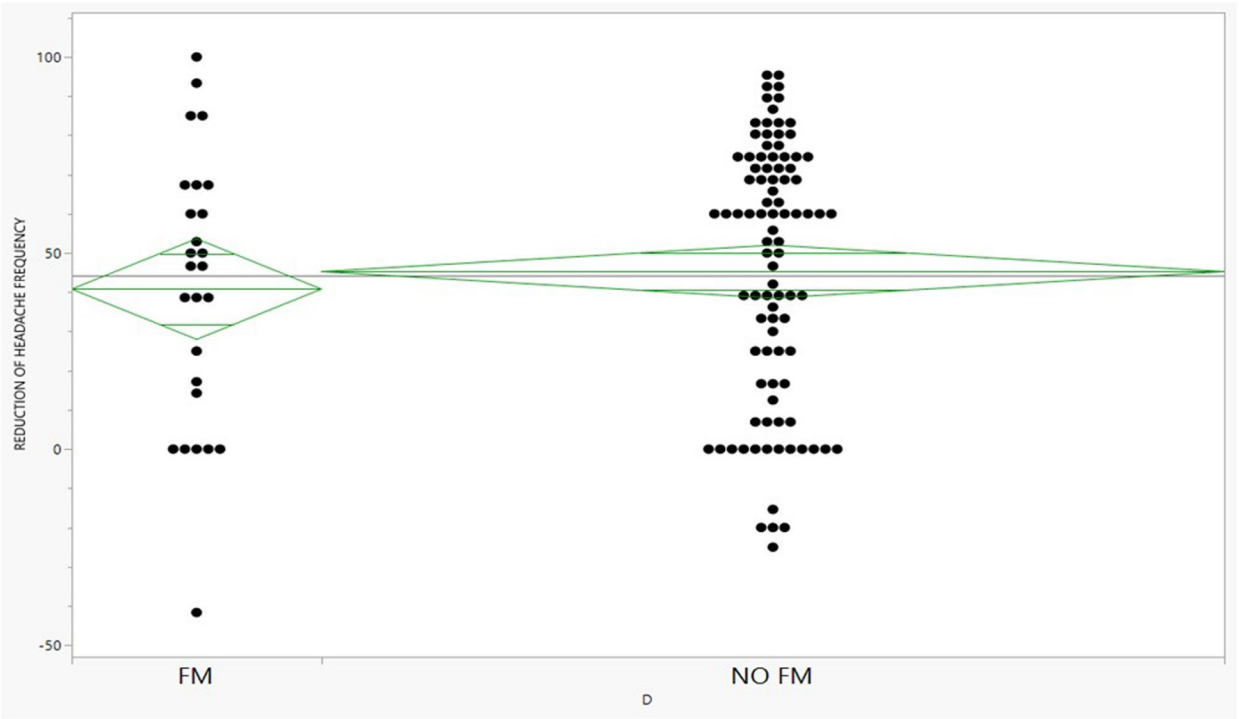

Fig. 2 Distribution of FM and non-FM patients based on the percentage reduction in headache frequency calculated in the last 3 months

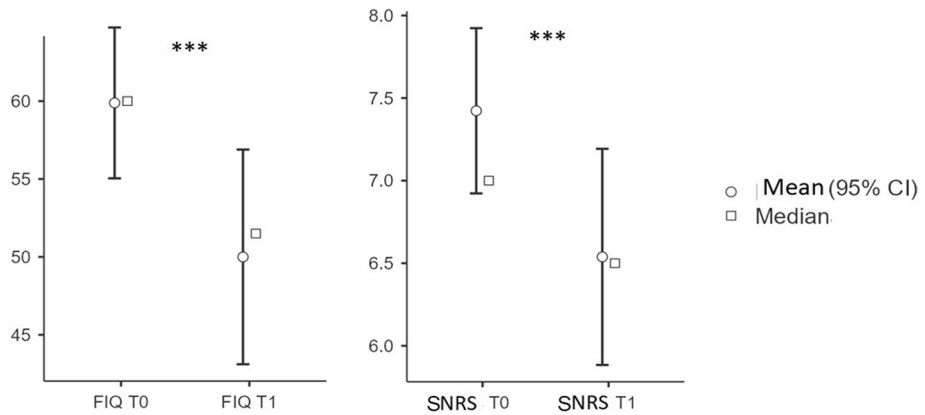

Fig. 3 Mean values, 95% CI and median values of the Fibromyalgia Impact Questionnaire (FIQ) and subjective somatic pain intensity with the numerical rating scale (SNRS) from 0–10 in 26 migraine patients with comorbidity for fibromyalgia.Results of t test are shown *** p 0.001 (FIQ t 4.69; SNRS t 4.07)

the disease with the patient's character could lead to low expectation of the effect of medication and even stigmatisation [12]. In addition, patients with FM suffer from diffuse somatic pain, so they may not consider headache as a priority. They frequently have criticism toward drugs and low adherence to medication [13].

Most patients who adhered to treatment and returned for follow-up had a good outcome for migraine, with a reduction in headache days of more than 30 per cent, as reported in previous studies [14]. They also improved in migraine related disability and use of rescue therapies, though their migraine remained more intense as compared to not fibromyalgia group. Patients with FM had increased phenomena of central sensitization and generally present more severe forms of headache [4, 15], which could explain the partial persistence of intense migraine.

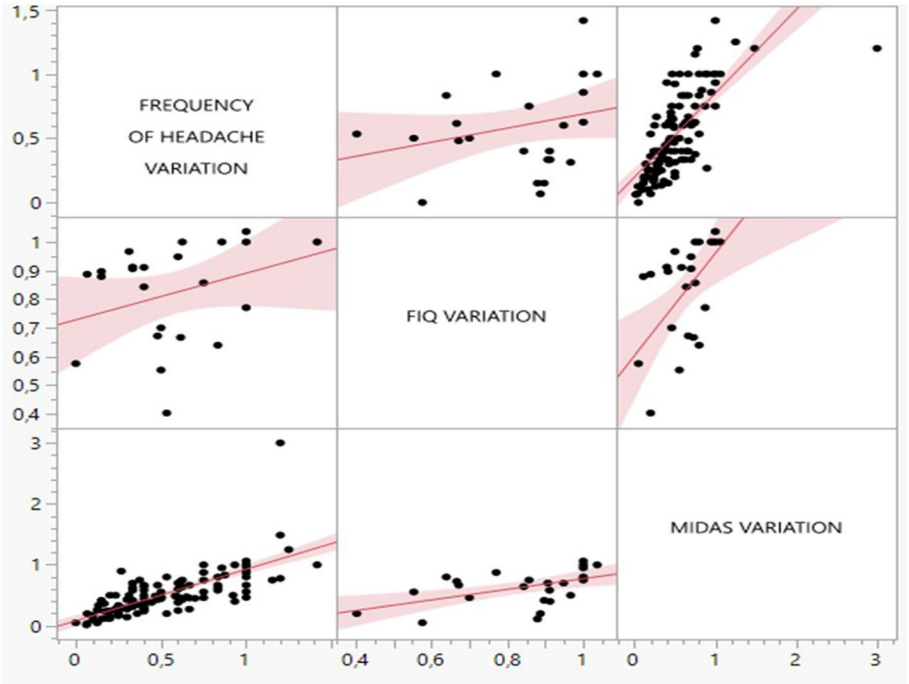

Fig. 4 Correlations between the percentage reductions in FIQ, MIDAS and headache frequency scores in the 26 migraine patients with FM comorbidity. The results of the Pearson correlation are shown. The correlation between FIQ and MIDAS improvement was significant (p 0.01)

However, the reduction in the intensity of migraine also made it possible to reduce the use of symptomatic medication in patients with fibromyalgia.

We found no relevant differences in the outcome of migraine between patients with episodic and chronic forms, with and without comorbidity for fibromyalgia. Our patients met the definition of resistant migraine [16], with 8 or more migraine days per month, which may explain the lack of relevant differences in clinical outcome between chronic and episodic forms, at least in our small case series. In both migraine groups, with and without FM comorbidity, some patients with medication overuse were also included, but again the small number of patients did not allow us to study these subgroups.

The novel finding is the good efficacy of anti-CGRP drugs on somatic pain intensity and associated disability, which is a potentially important factor in a syndrome for which there is no specific pharmacological treatment [5, 6]. The Disability for Fibromyalgia Scores (FIQ) includes several variables related to the global impact of the disease, such as sleep disturbance, anxiety, depression and fatigue. Feeling better with migraine could lead to an overall improvement in these variables, which may not be a direct and linearly correlated consequence of the decrease in headache frequency. However, the correlation between headache frequency and FIQ improvement reached near statistical significance, which needs to be confirmed in larger series.

In the patients who opted to continue anti-CGRP treatment, one disabling aspect of fibromyalgia improved, which had a positive effect on the global degree of disability.The reduction in the intensity of somatic pain reported by most patients could indicate a general nociceptive effect of CGRP outside the trigeminal-vascular district. A study by Korucu et al. [17] found that serum CGRP levels are higher in patients with FM than in healthy people. In addition, CGRP receptor proteins were higher in patients with FM. The monoclonal antibodies against CGRP act in the periphery because they are large molecules that do not cross the blood–brain barrier. CGRP levels are elevated in the periphery in inflammatory pathologies such as osteoarthritis and in neuropathic pain [7, 18], but the role of CGRP in FM is not yet clear. Furthermore, few studies have investigated anti-CGRP therapies specifically in FM, and the potential negative impact of FM comorbidity on the efficacy of anti-CGRP agents does not appear to be confirmed [19].A large number of FM patients suffer from non-length-dependent small fiber neuropathy, with possible phenomena of peripheral sensitization, in which CGRP could act as an inflammatory mediator [20], but this hypothesis, although suggestive, requires more solid evidence. A study conducted in 47

women with FM showed no correlation between CGRP serum levels and pain threshold at tender points and other clinical variables [21]

In addition, in a recent study, we observed that erenumab, a monoclonal antibody against the CGRP receptor, was able to reduce the cortical response associated with the a-delta fibers at the trigeminal level and not at the hand in a group of migraine patients, so that the inhibitory effect against CGRP could be exerted mainly in the trigeminal district, where these receptors could be more expressed [22]. While we cannot assume that monoclonal antibodies against CGRP play a primary role in the diffuse pain of FM, we can confirm a positive effect on migraine, which could influence the global disability of the disease. Further studies on the potential effect of CGRP on somatic diffuse myofascial pain are needed. Further study is needed on the possible effect of CGRP on somatic diffuse myofascial pain.

Limitations

The study is monocentric and is therefore limited by the small number of patients, which is also limited by the low compliance of migraine patients with fibromyalgia comorbidity. We did not apply a complete clinical assessment of patients with FM, though the FIQ included questions on various aspects of the disease, including pain, sleep, fatigue, anxiety and depression. Confounding factors such as the simultaneous intake of antidepressants were not investigated due to the limited number of patients.Subgroups of patients with medication overuse could be investigated in larger multicenter studies. Patients were selected on the basis of Italian regulations for prescribing medication for CGRP, so it was not possible to study patients with milder forms of migraine. Patients were selected basing on the Italian rules for anti CGRP drugs prescription, so it was not possible to evaluate patients with milder forms of migraine.

Conclusions

In this monocentric retrospective study in a small group of migraine patients with a comorbidity for fibromyalgia, we found that monoclonal antibodies against CGRP had a beneficial effect on migraine, similar to that in non-fibromyalgia patients, and furthermore reduced somatic pain and global disability from the disease. We cannot currently assume that the anti-CGRP drugs act on somatic myofascial pain, nor do we know the possible mechanism of this effect.

In any case, anti-CGRP agents that show their positive effect at least on migraine and thus on the globality of the disease seem to be a good option for the treatment of fibromyalgia in a disease for which there is still no resolutive therapy.

Abbreviations

CGRP	Calcitonin Gene Related Peptide
FIQ	Fibromyalgia Impact Questionnaire
FM	Fibromyalgia
IHS	International Headache Society
HNRS	Headache Numerical Rating Scale
SNRS	Somatic Numerical Rating Scale

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Authors' contributions

Authors' contributions MD: study design, data analysis, manuscript edit GP,LC: data collection, database GL and SS: clinical assessment.

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No specific fund was dedicated to the present study.

Data availability

Data is provided within the manuscript. Data are available at the following link under permission https://docs.google.com/spreadsheets/d/1Gurr4mb2tje1cyooETEOXnNneo_VyR0t/edit?usp=sharing&ouid=110847372392518883205&rtpof=true&sd=true.

Declarations

Ethics approval and consent to participate

As the study was a retrospective observation, it was not submitted to the ethics committee as all assessment procedures were carried out as part of routine clinical practice. However, in accordance with the rules of our hospital and national regulations on data processing, all patients signed a consent form to allow the use of their anonymized data for observational research.

Consent for publication

All patients signed a consent form to allow the use of their anonymized data for observational research and relative publication.

Competing interests

The authors declare no competing interests.

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References

1. Edvinsson L, Haanes KA, Warfvinge K, Krause DN (2018) CGRP as the target of new migraine therapies - successful translation from bench to clinic. Nat Rev Neurol 14(6):338–350. https://doi.org/10.1038/s41582-018-0003-1. (PMID: 29691490)
2. Caronna E, Alpuente A, Torres-Ferrus M, Pozo-Rosich P (2024) CGRP monoclonal antibodies and CGRP receptor antagonists (Gepants) in migraine prevention. Handb Clin Neurol 199:107–124. https://doi.org/10.1016/B978-0-12-823357-3.00024-0. (PMID: 38307640)
3. Wolfe F, Clauw DJ, Fitzcharles MA, Goldenberg DL, Häuser W, Katz RL, Mease PJ, Russell AS, Russell IJ, Walitt B (2016) 2016 Revisions to the 2010/2011 fibromyalgia diagnostic criteria. Semin Arthritis Rheum 46(3):319–329. https://doi.org/10.1016/j.semarthrit.2016.08.012
4. de Tommaso M, Federici A, Serpino C, Vecchio E, Franco G, Sardaro M, Delussi M, Livrea P (2011) Clinical features of headache patients with fibromyalgia comorbidity. J Headache Pain 12(6):629–38. https://doi.org/10.1007/s10194-011-0377-6. (Epub 2011 Aug 17. PMID: 21847547; PMCID: PMC3208047)

5. Devigili G, Di Stefano G , Donadio V , Frattale I, Grazzi L., Mantovani E, et al de Tommaso M° °on behalf of NEUROPATHIC PAIN SPECIAL INTEREST GROUP OF THE ITALIAN NEUROLOGICAL SOCIETY (SIN). (2025) Therapeutic approach to fibromyalgia: a consensus statement on pharmacological and non-pharmacological treatment from the neuropathic pain special interest group of the Italian neurological society Neurological Sciences, https://doi.org/10.1007/s10072-025-08048-3
6. Macfarlane GJ, Kronisch C, Dean LE, Atzeni F, Häuser W, Fluß E et al (2017) EULAR revised recommendations for the management of fibromyalgia. Ann Rheum Dis 76(2):318–328. https://doi.org/10.1136/annrheumdis-2016-209724
7. Schou WS, Ashina S, Amin FM, Goadsby PJ, Ashina M (2017) Calcitonin gene-related peptide and pain: a systematic review. J Headache Pain 18(1):34. https://doi.org/10.1186/s10194-017-0741-2. (Epub 2017 Mar 16. PMID: 28303458; PMCID: PMC5355411)
8. Obach V, Velasco F, Alvarez Escudero R, Martín Bujanda M, Aranceta S, Fabregat N, Marco T et al (2023) Long-term effectiveness and tolerability of galcanezumab in patients with migraine excluded from clinical trials: real world evidence of 1055 patients with 1 year follow-up from the Galca-Only registry. J Headache Pain 24(1):157. https://doi.org/10.1186/s10194-023-01690-2. (PMID: 37993795; PMCID: PMC10666410)
9. Sarzi-Puttini P, Atzeni F, Fiorini T et al (2003) Validation of anItalian version of the fibromyalgia impact questionnaire (FIQ-I). Clin Exp Rheumatol 21(4):459–464
10. Headache Classifcation Committee of the International Headache Society (IHS) (2018) The International Classifcation of Headache Disorders, 3rd ed. Cephalalgia 38(1):1–211
11. D'Amico D, Mosconi P, Genco S et al (2001) The Migraine Disability Assessment (MIDAS) questionnaire: translation and reliability of the Italian version. Cephalalgia 10:947–952. https://doi.org/10.1046/j.0333-1024.2001.00277.x
12. Armentor JL (2017) Living with a contested, stigmatized illness: Experiences of managing relationships among women with fibromyalgia. Qualit Health Res 27(4):462–473. https://doi.org/10.1177/1049732315620160
13. Sewitch MJ, Dobkin PL, Bernatsky S, Baron M, Starr M, Cohen M, Fitzcharles MA (2004) Medication non-adherence in women with fibromyalgia. Rheumatology (Oxford) 43(5):648–654. https://doi.org/10.1093/rheumatology/keh141
14. Prikhodkina M, Melnikov S (2024) (2024) Factors that influence medication adherence in women with fibromyalgia: A path analysis. J Clin Nurs 33(10):3943–3953. https://doi.org/10.1111/jocn.17044. (Epub 2024 Jan 29 PMID: 38284436)
15. Yunus MB (2000) Central sensitivity syndromes: a unified concept for fibromyalgia and other similar maladies. J Indian Rheumatol Assoc 8(1):27–33
16. Sacco S, Braschinsky M, Ducros A, Lampl C, Little P, van den Brink AM et al (2020) European headache federation consensus on the definition of resistant and refractory migraine: developed with the endorsement of the European Migraine & Headache Alliance (EMHA). J Headache Pain 21:76
17. Korucu RU, Karadağ A, Taş A, Özmen E, Hayta E, Siliğ Y (2020) Serum calcitonin gene-related peptide and receptor protein levels in patients with fibromyalgia syndrome: a cross-sectional study. Arch Rheumatol 35(4):463–467. https://doi.org/10.46497/ArchRheumatol.2020.7783. (PMID: 33758802; PMCID: PMC7945696)
18. Walsh DA, Mapp PI, Kelly S (2015) Calcitonin gene related peptide in the joint: contribution to pain and inflammation. Br J Clin Pharmacol 80:965–978
19. Polanco M, Gárate G, Sánchez-Gudín J, Madera J, Pascual J, González-Quintanilla V (2025) Real-world lessons with fremanezumab as the third available CGRP monoclonal antibody in a third-level hospital: focus on the factors predicting response. J Clin Med 14(4):1054. https://doi.org/10.3390/jcm14041054. (PMID:40004586;PMCID:PMC11856491)
20. de Tommaso M, Vecchio E, Nolano M (2022) The puzzle of fibromyalgia between central sensitization syndrome and small fiber neuropathy: a narrative review on neurophysiological and morphological evidence. Neurol Sci 43(3):1667–1684. https://doi.org/10.1007/s10072-021-05806-x. (Epub 2022 Jan 14 PMID: 35028777)
21. Tapia-Haro RM, Molina F, Rus A, Casas-Barragán A, Correa-Rodríguez M, Aguilar-Ferrándiz ME (2023) Serum VEGF and CGRP biomarkers: relationships with pain intensity, electric pain, pressure pain threshold, and clinical symptoms in fibromyalgia-an observational study. Int J Mol Sci 24(21):15533. https://doi.org/10.3390/ijms242115533. (PMID:37958517;PMCID:PMC10649295)
22. de Tommaso M, Delussi M, Gentile E, Ricci K, Quitadamo SG, Libro G (2021) (2021) Effect of single dose Erenumab on cortical responses evoked by cutaneous a-delta fibers: a pilot study in migraine patients. Cephalalgia 41(9):1004–1014. https://doi.org/10.1177/0333102421996345. (Epub 2021 Feb 16 PMID: 33593077)

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