



Original Research Article

Awareness and Patient-Related Oral Symptoms Related to Dental Implants in Individuals on Long-Term Bisphosphonate Therapy: A Survey-Based Study

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Name of Author:

Dr Ayesha Sajawal¹, Dr Parihan Khattak², Dr Khadeeja Jatoi³, Dr. Momena Zeb⁴, Dr Hifza Noor⁵, Dr Daniyal Naeem⁶

Affiliation: ¹BDS, RDS, FCPS II Prosthodontics Resident CMH Lahore Medical College & IOD.

² BDS, RDS Riphah Islamic International Dental College Islamabad

³BDS, RDS, MBA-HM Altamash Institute of Dental Medicine.

⁴BDS, RDS, FCPS II Prosthodontics Resident CMH Lahore Medical College & IOD.

⁵Bachelors of Dental Surgery (BDS) Islamic International Dental College and Hospital, Islamabad.

⁶BDS, RDS, FCPS II Prosthodontics Resident CMH Lahore Medical College & IOD.

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Abstract: Objectives: This study aimed to evaluate patient awareness regarding dental implant treatment and assess oral symptoms among individuals receiving long-term bisphosphonate therapy. **Methods:** A cross-sectional survey was conducted from March to June 2025 among patients on bisphosphonate therapy for ≥ 12 months. An anonymous, structured 25-item questionnaire assessed demographics, treatment characteristics, awareness of dental implants, knowledge of bisphosphonate-related complications, oral symptoms, and dental care-seeking behavior. Descriptive statistics were calculated, and the Chi-square test was used to compare categorical variables, with significance set at $p < 0.05$. **Results:** A total of 186 patients completed the survey (response rate 77.5%). Mean age was 58.4 ± 9.7 years, with 68.3% females. Mean duration of bisphosphonate therapy was 3.2 ± 1.8 years. Only 24.7% of patients had heard about dental implants as a tooth replacement option, and 12.9% were aware of potential complications with bisphosphonate use. Common oral symptoms reported included jaw pain (31.2%), dry mouth (45.2%), and gum problems (28.5%). Only 38.2% had received pre-treatment dental evaluation. Awareness was significantly higher among patients with higher education levels ($p = 0.003$) and those who had consulted dentists before starting therapy ($p < 0.001$). Nearly 82.3% expressed interest in learning more about safe dental treatment options. **Conclusions:** Significant gaps exist in patient awareness regarding dental implant contraindications and oral health management during bisphosphonate therapy. Systematic patient education programs and mandatory pre-treatment dental consultations are needed to prevent complications and improve treatment outcomes.

Keywords: bisphosphonates; dental implants; patient awareness; oral symptoms; MRONJ; osteoporosis; patient education

INTRODUCTION

Bisphosphonates stand as the initial pharmacological intervention, which can be used to treat osteoporosis and bone metastases and millions of patients are treated

with these drugs over the long term all over the world [1,2]. Although their effectiveness in preventing fracture and treating malignant bone disease is well proven, there are serious oral side effects, especially medication-related osteonecrosis of the jaw (MRONJ)

that has provoked serious clinical concerns [3,4].

Implantation of the teeth has now become the new standard of replacement of missing teeth, as it has better functional and aesthetic results than the conventional remedies used in the past [5]. Nevertheless, the use of bisphosphonate therapy is also becoming a relative contraindication to implant placement because of poor bone healing and increased risk of MRONJ [6,7]. According to the American Association of Oral and Maxillofacial Surgeons (AAOMS) guidelines, the risk should be prioritized before conducting invasive dental surgeries such as implant surgery in patients under antiresorptive medications [8].

Although healthcare providers are increasingly becoming professionally aware regarding these risks, patient-level awareness about these risks is poorly understood, especially in developing nations such as Pakistan. Past researchers have primarily concentrated on the knowledge and attitudes of healthcare providers [9,10], without much understanding having been done regarding awareness on oral complications of bisphosphonates and patient awareness of the dental treatment alternatives.

The pathophysiology of MRONJ is associated with several events, such as bone turnover inhibition, angiogenesis inhibition, local infection, and direct soft tissue toxicity [11]. Mandible and maxilla are the most susceptible ones since bone turnover is high, and these bones are exposed to oral microbiota [12]. Some of the risk factors are intravenous use, long period of therapy (>4 years), high cumulative doses, co-morbidity with corticosteroids, poor oral hygiene, and invasive surgery on the teeth [13,14].

Recent systematic reviews show that the MRONJ incidence can vary between 0.01 and 0.1% in the osteoporosis patients who have oral bisphosphonate treatment, but it goes up to 1-15% in the oncology patients undergoing the high dose intravenous therapy [15]. There is also an extra risk of the introduction of dental implants in bisphosphonate-treated patients, and the level of reported implant failures of 1.6-14.3 in these conditions as opposed to 2-3 in the general population [16,17].

Education of patients is also important in the prevention of MRONJ. Educated patients will also have higher chances of practicing good oral hygiene, frequency of active dental checkups and they will share medication history with dental care providers [18]. Nevertheless, the lack of communication among physicians, dentists, and patients frequently leads to the insufficiency of awareness and timely identification of the initial signs of danger [19].

In Pakistan, where the level of healthcare literacy is also quite differentiated and interdisciplinary

communication might be restricted, the awareness of the patient level is the key to developing specific educational interventions. Lack of adequate knowledge on osteoporosis has also been identified as threatening the lives of Pakistani women above 50 years of age, as osteoporosis prevalence rate is estimated at 50, and prescription of bisphosphonates is on the rise [20]. Nonetheless, there is no literature that investigates the awareness of Pakistani patients about bisphosphonate-associated oral complications or the knowledge level of patients about contraindications of dental implantation.

The paper fills this knowledge gap by evaluating: (1) patient education about the treatment options and contraindications of dental implantation, (2) the incidence and the nature of reported orally-related symptoms, (3) dental care-seeking behavior prior to and during the bisphosphonate therapy, and (4) predictors of a higher level of awareness. Knowledge of these parameters will be useful in devising patient education measures and enhance the provision of preventive care.

2. Materials and Methods

2.1. Study Design and Setting

This was a questionnaire-based study that involved cross-sectional work in CMH Lahore Medical College and related hospitals between March and June of 2025.

2.2. Study Population

Inclusion criteria:

- Adults (≥ 18 years) receiving bisphosphonate therapy for ≥ 12 months
- Diagnosis of osteoporosis, osteopenia, or malignant bone disease
- Ability to read and understand Urdu or English
- Willingness to provide informed consent

Exclusion criteria:

- Patients with cognitive impairment preventing informed consent
- History of head and neck radiation therapy
- Previous diagnosis of MRONJ
- Bisphosphonate therapy duration <12 months

2.3. Sample Size Calculation

Sample size was calculated using the formula for cross-sectional studies: $n = (Z^2 \times p \times q) / d^2$

The minimum sample size by assuming that 50% of the population were aware ($p = 0.5$), 95% confidence interval ($Z = 1.96$) and 5% margin of error ($d = 0.05$) was 384. We wanted to sample 240 patients to allow accounting of 20% non-response rate.

2.4. Sampling Method

Sequential patients with inclusion criteria were selected in the outpatient departments of the Medicine, Orthopedics, Oncology and Endocrinology. The

patients were contacted on the regular follow-up and asked to take part.

2.5. Questionnaire Development

The construction of the structured self-administered questionnaire was built on the literature review and specialist consultation with oral surgeons, prosthodontists, and pharmacologists. The instrument underwent:

1. Content validation: Relevance and clarity were tested by an expert panel (Content Validity Index = 0.89)
 2. Translation: Bilingual (English and Urdu) translations made through forward-backward translation.
 3. Pilot testing: Given to 25 patients; adjusted through the feedback.
 4. Reliability test: Cronbach alpha = 0.76, which means internal consistency is also acceptable.
- The questionnaire used in the final stage had 25 items placed in five sections:

Section A: Demographics and Medical History (7 items)

- Age, gender, education level, occupation
- Primary diagnosis, type of bisphosphonate, duration of therapy, route of administration

Section B: Awareness of Dental Implants (5 items)

- Familiarity with dental implants as treatment option
- Source of information about implants
- Awareness of contraindications
- Knowledge of bisphosphonate-implant interactions

Section C: Knowledge of Bisphosphonate-Related Oral Complications (5 items)

- Awareness of MRONJ
- Understanding of risk factors
- Recognition of early warning signs
- Information received from prescribing physician

Section D: Oral Symptoms and Dental History (5 items)

- Self-reported oral symptoms
- Pre-treatment dental evaluation
- Current dental care patterns
- History of dental procedures during bisphosphonate therapy

Section E: Educational Needs and Preferences (3 items)

- Interest in receiving more information
- Preferred information sources
- Barriers to dental care

2.6. Data Collection

The data was collected within 12 weeks. In the waiting areas, research assistants identified qualified patients and informed them on the purpose of the study and obtained informed consent in writing. Indirectly, the questionnaires were given to the participants in a large room where they were allowed to fill them on their own and with help when necessary. All questionnaires were filled in and sent back in their sealed envelopes to guarantee anonymity.

2.7. Statistical Analysis

Data were typed into Microsoft Excel 2021 and processed with the help of the IBM SPSS Statistics version 26.0. The descriptive statistics were achieved by means of standard deviations as the means and frequencies with percentages as frequencies of the categorical variables.

Chi-square tests were used to determine the awareness and knowledge of the demographic subgroups. Continuous variables were compared independently using t-tests. Multivariable logistic regression determined predictors of high awareness (correct answers to 75 or more awareness and knowledge items). The outcomes are presented in the form of adjusted odds ratios (AOR) and confidence intervals. The level of statistical significance was $p < 0.05$.

RESULTS

3.1. Response rate and Demographics

Among 240 eligible patients approached, 186 patients filled the questionnaire, thus, a response rate of 77.5% (95% CI: 72.1-82.9%). The average age was 58.4 years of age with a standard deviation of 9.7 years (36 to 78 years). Table 1 shows treatment characteristics and demographics of participants..

Table 1. Demographic and Clinical Characteristics of Participants (N=186)

Characteristic	n	%
Gender		
Female	127	68.3
Male	59	31.7
Age Group		
36-45 years	23	12.4
46-55 years	51	27.4

Characteristic	n	%
56-65 years	78	41.9
>65 years	34	18.3
Education Level		
No formal education	38	20.4
Primary/Middle	52	28.0
Secondary/Higher secondary	61	32.8
University degree	35	18.8
Primary Diagnosis		
Osteoporosis	142	76.3
Osteopenia	28	15.1
Bone metastases	11	5.9
Multiple myeloma	5	2.7
Bisphosphonate Type		
Alendronate (oral)	156	83.9
Risedronate (oral)	18	9.7
Zoledronic acid (IV)	12	6.5
Duration of Therapy		
1-2 years	68	36.6
2-4 years	74	39.8
>4 years	44	23.7

3.2. Awareness of Dental Implants

Only 46 patients (24.7%) had heard about dental implants as a tooth replacement option (Table 2). Among these, sources of information were: dentist consultation (52.2%), family/friends (30.4%), media/internet (13.0%), and physician (4.3%). Critically, only 24 patients (12.9% of total sample) were aware that bisphosphonate therapy could affect dental implant success. When asked specifically about contraindications to dental implants, 91.4% of participants were unaware of any medication-related restrictions.

Table 2. Patient Awareness Regarding Dental Implants and Bisphosphonate-Related Complications

Knowledge Item	Aware n (%)	Not Aware n (%)
Heard about dental implants	46 (24.7)	140 (75.3)
Aware of BP-implant complications	24 (12.9)	162 (87.1)
Knows about MRONJ	18 (9.7)	168 (90.3)
Informed by physician about oral risks	43 (23.1)	143 (76.9)
Advised pre-treatment dental check	71 (38.2)	115 (61.8)
Knows importance of dental hygiene during BP therapy	89 (47.8)	97 (52.2)

3.3. Knowledge of MRONJ and Risk Factors

Only 18 patients (9.7%) had heard the term "osteonecrosis of the jaw" or MRONJ. When asked about potential oral complications of bisphosphonate therapy, awareness was limited:

- Jaw bone problems: 14.5%
- Delayed healing after tooth extraction: 8.6%
- Jaw pain: 22.0%
- No complications expected": 71.5%

Among patients aware of oral risks, only 38.9% (n=7) could identify at least one risk factor (prolonged therapy duration, invasive dental procedures, or poor oral hygiene).

3.4. Oral Symptoms During Bisphosphonate Therapy

Table 3 presents the prevalence of self-reported oral symptoms. The most common symptoms were dry mouth (45.2%), jaw pain (31.2%), and gum problems (28.5%).

Table 3. Prevalence of Self-Reported Oral Symptoms (N=186)

Symptom	n	%
Dry mouth (xerostomia)	84	45.2
Jaw pain or discomfort	58	31.2
Gum problems (swelling/bleeding)	53	28.5
Loose teeth	31	16.7
Difficulty chewing	42	22.6
Mouth sores/ulcers	19	10.2
Exposed bone or non-healing wounds	3	1.6
Bad breath (halitosis)	37	19.9
Change in taste	28	15.1
No oral symptoms	67	36.0

Patients experiencing jaw pain were more likely to have been on therapy >4 years ($p = 0.021$) and to have undergone dental extractions during treatment ($p = 0.008$).

3.5. Dental Care Patterns

Only 71 patients (38.2%) reported receiving dental evaluation before starting bisphosphonate therapy. During treatment, dental care attendance was poor:

- Regular dental visits (6-12 months): 18.3%
- Occasional visits (only when problems arise): 44.6%
- No dental visits during therapy: 37.1%

Among 98 patients (52.7%) who had missing teeth, only 12 (12.2%) had consulted a dentist about replacement options, and none had been informed about implant contraindications.

3.6. Information Sources and Physician Communication

Most patients (76.9%) reported that their prescribing physician did not discuss potential oral complications. Only 23.1% received any oral health counseling, which typically consisted of general hygiene advice without specific mention of MRONJ risk or need for specialist dental consultation.

3.7. Factors Associated with Higher Awareness

Chi-square analysis revealed significant associations between awareness levels and several demographic factors (Table 4).

Table 4. Association Between Demographics and Awareness of BP-Implant Complications

Variable	Aware of Complications n (%)	Not Aware n (%)	p-value
Education Level			0.003*
No formal education	1 (2.6)	37 (97.4)	
Primary/Middle	3 (5.8)	49 (94.2)	
Secondary/Higher secondary	8 (13.1)	53 (86.9)	
University degree	12 (34.3)	23 (65.7)	
Pre-treatment Dental Consultation			<0.001*
Yes	19 (26.8)	52 (73.2)	
No	5 (4.3)	110 (95.7)	
Duration of Therapy			0.156
1-2 years	11 (16.2)	57 (83.8)	
2-4 years	8 (10.8)	66 (89.2)	
>4 years	5 (11.4)	39 (88.6)	
Gender			0.624
Female	15 (11.8)	112 (88.2)	
Male	9 (15.3)	50 (84.7)	

Statistically significant at $p < 0.05$

Multivariable logistic regression analysis (Table 5) identified university education (AOR = 8.42, 95% CI: 2.31-30.71, $p = 0.001$) and pre-treatment dental consultation (AOR = 7.18, 95% CI: 2.34-22.03, $p < 0.001$) as independent predictors of awareness. Age, gender, and duration of therapy were not significant predictors.

Table 5. Multivariable Logistic Regression Analysis of Predictors of Awareness

Predictor Variable	Adjusted OR	95% CI	p-value
University education (vs. no formal education)	8.42	2.31-30.71	0.001*
Pre-treatment dental consultation	7.18	2.34-22.03	<0.001*
Age >65 years	1.23	0.41-3.68	0.712
Female gender	0.82	0.31-2.17	0.689
Therapy duration >4 years	1.45	0.48-4.38	0.508
IV bisphosphonate	2.34	0.53-10.35	0.262

Statistically significant; Hosmer-Lemeshow test: p = 0.482 (good model fit)

3.8. Educational Needs and Preferences

An overwhelming majority (82.3%, n=153) expressed strong interest in receiving more information about safe dental care during bisphosphonate therapy. Preferred information delivery methods were:

Face-to-face counseling by physician: 68.3%

Written educational materials: 52.7%

Consultation with dentist: 45.7%

Video presentations: 18.8%

Reported barriers to dental care included:

Cost concerns: 62.4%

Lack of awareness about need: 48.4%

Fear of dental procedures: 31.2%

Transportation difficulties: 24.7%

Belief that oral health is not priority: 19.4%

DISCUSSION

The research finds that there are serious gaps in patient education on dental implant contraindication and oral complication of bisphosphonates in a Pakistani population. The percentage of patients who realized the possible risks of dental implants during bisphosphonate treatment was only 12.9 and less than 10% of the patients who received bisphosphonate treatment had heard about MRONJ although they were exposed to its risk. The results highlight the fact that systematic patient education protocols are urgently needed.

4.1. Limited Awareness of Dental Implants and Contraindications

The fact that just 24.7% of respondents knew about dental implants as a treatment option is significantly lower than the rates in Western populations (55-70%) [21,22]. This is probably an indication of socioeconomic status, inadequate access to specialty care dental services, and reduced health literacy of developing countries. Worse is the fact that, even with patients who were aware of implants, half of them knew that there were medications that could influence the outcome of treatment.

This clinical implication in knowledge gap is severe. Patients with no knowledge about contraindications may request implant treatment without revealing the use of bisphosphonates or dentists may still do the procedure without sufficient risk assessment. A survey by Jacobsen et al. established that a quarter of

the MRONJ cases that transpired after implant placement happened due to lack of awareness of the history of bisphosphonates either by the patient or the dentist [23].

4.2. Poor Understanding of MRONJ Risk

In our study, the awareness rate of MRONJ is 9.7 percent, which is similar to 11.2 percent in Saudi Arabia (24) and 8.4 percent in Brazil (25), but significantly less than those of developed nations. Canadian study showed 34% awareness rate amongst bisphosphonate users [26] and a German study showed 42% received the information on jaw complications [27].

According to our findings, 71.5% of patients were not anticipating oral complications of bisphosphonate treatment and this is an indication of dangerous misconception. It is also compatible with the results of the study conducted by Lopez-Jornet et al., who have found that 68 percent of Spanish patients took bisphosphonates as absolutely safe regarding their oral hygiene [28].

The lack of awareness is low even though the patients spend 2+ years on therapy, which indicates that even longer periods without active education do not enhance the knowledge levels. This is in contrast to chronic illnesses such as diabetes where patient knowledge in most cases tends to enhance with time due to the repetitive nature of the counseling procedure [29].

4.3. High Prevalence of Oral Symptoms

The large percentage of patients who reported having oral symptoms (64) is also a cause of concern due to the under-identification of the possible complications. Although the prevalence of dry mouth (45.2%) and gum problems (28.5%) is not dependent on medications in this group [30], the presence of jaw pain in almost a third of the patients is a reason to investigate.

Importantly, three patients (1.6) had reported exposed bone or non-healing wounds -a possible indication of early MRONJ. These patients had not consulted dental care and this may be due to the fact that they were not aware of the importance of these symptoms. The initial stages of the MRONJ are

often asymptomatic or have non-specific symptoms that patients are likely to ignore [31].

The correlation of jaw pain and longer period of therapy ($p=0.021$) and extractions history ($p=0.008$) are also consistent with the established sources of MRONJ risks [8]. These results indicate potential instances of undiagnosis condition through systematic oral screening procedures.

4.4. Inadequate Pre-Treatment Dental Assessment

The number of patients who were evaluated by dentists prior to starting the use of bisphosphonates was only 38.2% which is way below international standards. AAOMS guidelines clearly advise that dental examination and taking the required invasive procedures must be done to the completion before administration of antiresorptive therapy begins [8]. The Italian Society of Oral Pathology recommends the routine of dental clearance of all patients [32].

This deficiency is probably due to various reasons: (1) a lack of awareness in prescribing doctors of the necessity of dental referral, (2) the lack of uniformity in the Pakistani healthcare context, (3) medical and dental care systems working in silos with low levels of communication, and (4) the lack of access and affordability of patients.

Research has continually shown that dental optimization upon pre-treatment will go a long way in lowering the MRONJ occurrence. According to Bonacina et al., 81% of the risk of MRONJ decrease was reported in cancer patients who were subjected to prevention of dental health prior to starting the use of bisphosphonates [33].

4.5. Physician-Patient Communication Gaps

The observation that 76.9% of the patients never talked to their prescribing physician about oral complications is a significant communication breakdown. This is greater than what is reported in studies in Europe (45-60%) [27,34] but is in agreement with other populations in Asia [35].

This gap is caused by a variety of reasons: time pressure in clinics with a heavy patient load, inadequate understanding of the dental component by the physicians (as evidenced by our previous survey of dentists), the belief that the integrated care model will include specific advices, and the absence of relevant care models.

Interestingly, when the physicians actually administered oral health counseling, it was an excellent predictor of patient awareness ($p<0.001$), which is the strong role played by physician-initiated conversations. This indicates that comparatively easy interventions, like supplying the doctors with scripted points of counseling and referral guidelines, might

significantly enhance patient knowledge.

4.6. Education and Socioeconomic Factors

The close relationship between higher education and awareness (university education: AOR=8.42) indicates wider health literacy trends. Patients who are highly educated tend to research their medicine, question and preventive care [36]. Nevertheless, it brings equity issues of vulnerable populations with weak education facing an unproportional risk.

Special educational activities should consider literacy levels. Our population showed that 48.4 were all at the primary education or less, so they required visual tools, verbal instruction and culturally relevant reading material as opposed to the sophisticated written text.

4.7. Barriers to Dental Care

The notion that cost is the most significant deterrent (62.4%) demonstrates that Pakistan has a predominantly out-of-pocket healthcare system. Dental treatment is not often insurable, and patients with chronic illnesses are already under the pressure of financial resources in the form of drugs and medical follow-ups.

Almost one-fifth of patients (48.4%), during the use of bisphosphonates, were unfamiliar with the need to take care of their teeth, which is a changeable obstacle to overcome by educating patients. This is contrary to the barriers that are irrevocable such as cost or transportation and indicates that the preventive care use can be enhanced significantly with awareness campaigns.

4.8. Clinical Implications and Recommendations

According to our results, we suggest a multi-level intervention model:

Physician Level:

1. Prescription of bisphosphonates (contain mandatory dental referral)
2. Patient counseling checklist standardized based on oral risks, monitoring symptoms, and dental follow-up significance.
3. Ongoing medical training on MRONJ prevention and dental issues.

Patient Level:

1. Prepare and test culturally relevant educational resources in Urdu and English.
2. Design patient decision support in regard to tooth replacement, which indicates the dangers of implants.
3. Introduce peer support programs in which skilled patients provide preventive care techniques.

System Level:

1. Create combined care pathways between medical and dental care.
2. Design dental checks schemes with subsidies to bisphosphonates users.
3. Introduce e-MR warnings against bisphosphonate in dental practice.

Dental Profession Level:

1. Regular drug history taking including specific inquiry on bisphosphonates.
2. Cooperation agreements with prescriptive doctors of high-risk patients.
3. Early detection and referral pathways development of MRONJ.

4.9. Comparison with International Studies

Our levels of awareness are one of the lowest ever recorded in the world indicating specific issues that are encountered in the acquisition of healthcare systems. Henk et al. found that there was a systematic review that reported average patient awareness of MRONJ between 15-42 per cent in developed countries [37], and that we had 9.7 per cent.

The trend of knowledge gaps is, however, universal. There are certain gaps in the awareness related to pre-procedural management, symptom identification, and implant contraindications even in the countries with more general awareness [38]. This implies that mere provision of information is inadequate, there is need to have guided learning where the learning is checked.

4.10. Strengths and Limitations

Strengths:

Prospective awareness study in the awareness of patients in Pakistani population.
Good internal consistency validated questionnaire.
Sufficient sample of good response.
Both symptom assessment and awareness included.
Multivariate analysis that has confounders.

Limitations:

Single-center research can be a problem with regard to generalizability.
Self-reported, clinically unconfirmed symptoms
Cross-sectional design is not able to determine causality.
Selection bias can be created by convenience sampling.
Recall bias of treatment history and symptoms.
Failed to evaluate physician practices and knowledge directly.
Minor examination of real MRONJ prevalence.
Failure to measure the effectiveness of interventions.

4.11. Future Research Directions

There are also some crucial questions to consider:

1. Future research where bisphosphonates are

followed up on patients to study the variations in awareness and whether they are associated with results.

2. Intervention trials comparing various educational methods (e.g. multimedia modules vs. counseling vs. written materials) to find out the most effective ones.
3. Clinical audits of actual MRONJ prevalence to define whether low awareness is associated with increased prevalence of complication.
4. The study of patient experiences, beliefs regarding bisphosphonates, and impediments to dental treatment in depth: qualitative research.
5. Cost-effectiveness procedures of systematic dental screening programs.
6. Research on how to combine dental care into the regimen of bisphosphonate administration in resource-restricted conditions.

CONCLUSION

The present study indicates the existence of alarming gaps in patient education about contraindications to dental implants and oral complications of long-term bisphosphonate use. Only 12.9% and less than 10% of patients know about the possible complications of BP-implantation and the existence of MRONJ, which makes it necessary to address the knowledge gap as soon as possible.

The oral symptoms prevalence (64%), negligence in dental care use (37% never went to dentist during treatment) indicates that there might be under-appreciation of complications. The association between dental consultation before treatment and awareness (AOR=7.18) is very strong, which proves that a systematic patient education at the beginning of the treatment course might significantly enhance the results.

All these knowledge deficits are compounded by the healthcare system fragmentation, the lack of physician-patient communication, and socioeconomic barriers. Detailed measures should be of a multi-level character: increasing awareness and communication among physicians, creating easily available patient education resources, creating a system of medical-dental collaboration, and eliminating financial obstacles to preventive dental treatment.

These findings have a wide implication considering the increasing incidence of osteoporosis and the use of bisphosphonates in different societies especially in aging societies of developing nations. The education of patients alongside progressive prevention measures is the key to reducing the risk of MRONJ and providing safe and effective long-term care with the help of bisphosphonates.

The next research must assess other educational measures, assess the real MRONJ rates with

awareness rate, and design a plan of implementation regarding integrated care models under resource constraint conditions. It is only when there is a concerted effort in the medical field, dental field and in the field of public health that patients who are using these useful yet potentially dangerous drugs can be properly safeguarded.

Informed Consent Statement

All the subjects were informed about the study before giving their consent.

Data Availability Statement

The authors will make the data used to draw the conclusions of this article available on the request of a reasonable person.

Conflicts of Interest

The authors do not disclose any conflict of interest.

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