

Original article

Awareness and Preventive Practices of Medication-Related Osteonecrosis of the Jaw Among Dental Practitioners in Tripoli, Libya

Moftah Alsharif^{*}, Mayar Alghoul^{}, Arwa Alsharif^{}, Noura Jugna^{}, Jumana Ben Mousa^{}, Alaa Terbel^{}

Department of Oral and Maxillofacial Surgery, Faculty of Dentistry, Attahadi University, Tripoli, Libya

Email. miftah.alsharif@attahadi.edu.ly

ABSTRACT

Keywords:

MRONJ, Bisphosphonates, Denosumab, Dental Practitioners, Tripoli, Libya.

Medication-Related Osteonecrosis of the Jaw (MRONJ), a severe adverse reaction characterized by exposed maxillofacial bone persisting for over eight weeks in patients exposed to bone-modifying agents (BMAs) without prior radiation therapy, requires diligent preventative screening by dental practitioners. This descriptive cross-sectional study evaluated baseline awareness and clinical preventive practices regarding MRONJ among 100 practicing dentists across multiple clinical settings in Tripoli, Libya, between November 2025 and January 2026 using a structured, self-administered questionnaire analyzed via SPSS version 27.0. The analysis demonstrated that 58.0% of respondents possessed a moderate level of awareness regarding BMAs and MRONJ, while 24.0% exhibited high awareness, and 18.0% scored low. Although 87.0% accurately identified tooth extraction as the most critical local surgical risk factor triggering osteonecrosis, a substantial clinical gap was highlighted, as only 45.0% of practitioners reported routinely and comprehensively inquiring about the use of bone-modifying medications during standard medical history intake. No statistically significant correlations were observed between overall awareness levels and clinical experience ($p = 0.126$) or dental specialization ($p = 0.823$). While fundamental theoretical knowledge surrounding MRONJ is moderate among Tripoli dental practitioners, it fails to routinely transition into robust, defensive clinical history-taking and prevention, indicating that standardized pre-surgical screening protocols and targeted continuous medical education are urgently required to bridge this clinical gap.

Introduction

Medication-Related Osteonecrosis of the Jaw (MRONJ) is an uncommon but severely debilitating condition affecting the maxillofacial skeleton. It is characterized by the presence of exposed, necrotic bone or bone that can be probed through an intraoral or extraoral fistula in the maxillofacial region, which persists for more than 8 weeks [1]. Critically, this diagnosis is applicable only to patients who have a documented history of current or prior treatment with bone-modifying agents (BMAs) or angiogenic inhibitors, and who have no history of therapeutic radiation therapy to the craniofacial complex [2]. The condition results in substantial patient morbidity, presenting with severe localized pain, secondary bacterial infections, pathological jaw fractures, and chronic draining fistulas, which fundamentally degrade the patient's quality of life [3]. Historically, this pathological entity was first documented in the clinical literature in 2003 by Robert E. Marx, who reported a series of avascular bone necrosis cases specifically linked to the administration of intravenous aminobisphosphonates, naming it Bisphosphonate-Related Osteonecrosis of the Jaw (BRONJ) [4]. However, as pharmacological strategies evolved, non-bisphosphonate antiresorptive medications, such as the human monoclonal antibody Denosumab (a RANK-ligand inhibitor), and various antiangiogenic therapies (e.g., Bevacizumab, Sunitinib) used in oncology were also found to precipitate identical clinical manifestations [5]. Recognizing this shifting pharmacological landscape, the American Association of Oral and Maxillofacial Surgeons (AAOMS) updated its clinical consensus in 2014, expanding the terminology to Medication-Related Osteonecrosis of the Jaw (MRONJ) to encompass all therapeutic agents implicated in its pathogenesis [2,6].

The primary medical indications for these implicated bone-modifying agents span both malignant and non-malignant metabolic bone diseases. In oncology, high-dose intravenous bisphosphonates (such as Zoledronic Acid) and subcutaneous denosumab are routinely utilized to mitigate skeletal-related events (SREs) in patients suffering from multiple myeloma or advanced solid tumors metastasized to the bone (e.g., breast, prostate, and lung carcinomas) [7]. Conversely, in general medicine, lower-dose oral bisphosphonates (e.g., Alendronate, Risedronate) and less frequent antiresorptive injections are widely prescribed to manage systemic bone loss in postmenopausal osteoporosis, Paget's disease, and osteogenesis imperfecta [8].

Despite the recognized gravity of MRONJ, a clear variance often persists between established evidence-based clinical guidelines and the real-world prophylactic behavior of dental practitioners. Many clinicians maintain an outdated perception that osteonecrosis risks are exclusively confined to traditional bisphosphonates, frequently overlooking newer antiresorptive and antiangiogenic regimens [9]. Furthermore, in developing healthcare contexts, including Libya, the exact

baseline awareness, educational retention, and daily preventative habits of local dental practitioners remain poorly quantified due to a total lack of structured epidemiological data. This critical investigative gap compromises the implementation of uniform screening protocols. Therefore, this study aimed to comprehensively evaluate the theoretical awareness, diagnostic knowledge, and preventative clinical practices concerning MRONJ among a cohort of dental practitioners operating within the capital city of Tripoli, Libya.

Methods

Study Design and Setting

This study was executed as a descriptive, questionnaire-based cross-sectional investigation over a three-month duration from November 2025 to January 2026. The target population encompassed actively practicing dental professionals, including general dental practitioners (GDPs), specialists, and clinical residents, operating within both public hospital facilities and private dental clinics across the metropolitan area of Tripoli, Libya.

Sample Size and Sampling Technique

A convenient sampling strategy was employed to recruit participants. A cohort of 100 valid and fully completed questionnaires was accumulated from practicing dentists who consented to participate. The inclusion criteria required respondents to hold a minimum of a Bachelor's degree in Dental Surgery (BDS), be actively engaged in clinical practice in Tripoli, and express voluntary consent. Dentists completely retired from active clinical operations or undergraduate students were excluded.

Data Collection Instrument

Data collection was performed utilizing a structured, self-administered questionnaire specifically adapted from validated instruments deployed in similar global epidemiological surveys [10,11]. The final questionnaire was organized into four distinct thematic sections, beginning with an assessment of socio-demographic and professional characteristics—including years of clinical experience, current specialization, and prior exposure to MRONJ cases—followed by a module evaluating theoretical and diagnostic knowledge of the disease's defining criteria, pharmacological triggers, and high-risk patient profiles. The survey then shifted focus to risk factor identification, probing which dental procedures and local clinical pathologies are most strongly linked to the onset of osteonecrosis, and concluded with a section on preventive clinical behaviors, which quantified the frequency of medical history screening, treatment plan modifications, and interdisciplinary collaborative practices.

Ethical Considerations

Prior to data collection, formal institutional approval was secured. Each participant received an introductory briefing explaining the academic objectives of the study. Absolute anonymity and strict data confidentiality were maintained throughout the process. Voluntary submission of the completed questionnaire was deemed as implied informed consent.

Statistical Analysis

Data processing and statistical computations were conducted via the Statistical Package for the Social Sciences (SPSS) software, version 27.0 (IBM Corp., Armonk, NY, USA). Descriptive statistics summarized the data utilizing raw frequencies (N) and percentages (%). To grade overall awareness, an additive scoring index was formulated based on 11 core factual questions. Each correct selection was awarded 1 point, yielding a cumulative score range of 0 to 11. Scores were categorized into three tiers: Low Awareness (0–3 points), Moderate Awareness (4–7 points), and High Awareness (8–11 points). Bivariate analytical evaluations were performed utilizing the Pearson Chi-square test (χ^2) to assess cross-tabulated associations between professional traits and awareness tiers. Statistical significance thresholds were set at $p \leq 0.05$.

RESULTS

Socio-Demographic and Professional Profile

The final evaluable sample comprised 100 dental practitioners. Regarding professional experience, 25.0% had been practicing for less than 5 years, 29.0% reported between 5 and 10 years of experience, and 46.0% possessed more than 10 years of active clinical tenure. Stratification by specialization revealed that the majority of respondents were general dental practitioners (68.0%), followed by oral and maxillofacial surgeons (10.0%), prosthodontists (9.0%), and periodontists (5.0%), with other specialties constituting the remaining 8.0%. Additionally, only 24.0% of the surveyed cohort reported having directly encountered or managed at least one active clinical case of MRONJ in their professional career.

Risk Factor and Diagnostic Awareness

Practitioners were questioned regarding which specific dental interventions carry the highest potential to initiate MRONJ. As detailed in Table 5, an overwhelming majority of 87.0% accurately identified surgical tooth extraction as the primary local risk factor. This distribution was found to be highly statistically significant ($p = 0.001$) as mentioned in Table 1.

Table 1. Dental procedures identified as most strongly associated with MRONJ development (n=100)

Identified Dental Procedure	Frequency (N)	Percentage (%)	P-value
Restorative treatment / Fillings	4	4.0%	0.001
Endodontic treatment	7	7.0%	
Tooth extraction	87	87.0%	
Orthodontic treatment	2	2.0%	

Preventive Clinical Practices

When examining specific prophylactic clinical workflows, an important gap between knowledge and clinical execution was observed. While 75.0% of practitioners stated they actively modify their definitive treatment strategies when treating patients known to be taking bone-modifying agents, less than half (45.0%) reported that they always or routinely check for these specific classes of medications during general medical history-taking.

Overall Awareness Grading and Associated Professional Factors

Grading via the cumulative 11-point index demonstrated that 58.0% of Tripoli dental practitioners fell within a moderate awareness bracket. High awareness was recorded in 24.0%, while 18.0% exhibited low awareness, as shown in Table 2 and Table 3.

Table 6. Graded awareness levels of dental practitioners regarding BMAs and MRONJ (n=100)

Awareness Level Tier	Score Range Criterion	Frequency (N)	Percentage (%)	P-value
Low Awareness	0 – 3 points	18	18.0%	0.001
Moderate Awareness	4 – 7 points	58	58.0%	
High Awareness	8 – 11 points	24	24.0%	

Table 3. Distribution of overall awareness levels across demographic and professional characteristics

Characters			Low awareness	Moderate awareness	High awareness	Total	X ²	P-value
Years of clinical experience	Less than 5 years	N	3	13	9	25	7.202	0.126
		%	16.7%	22.4%	37.5%	25.0%		
	5–10 years	N	9	14	6	29		
		%	50.0%	24.1%	25.0%	29.0%		
	More than 10 years	N	6	31	9	46		
		%	33.3%	53.4%	37.5%	46.0%		
Dental specialty	General Dentistry	N	12	39	17	68	4.366	0.823
		%	66.7%	67.2%	70.8%	68.0%		
	Oral and Maxillofacial Surgery	N	2	4	4	10		
		%	11.1%	6.9%	16.7%	10.0%		
	Periodontics	N	1	4	0	5		
		%	5.6%	6.9%	0.0%	5.0%		
	Prosthodontics	N	1	6	2	9		
		%	5.6%	10.3%	8.3%	9.0%		

	Other (Orthodontics, Endodontics, Pedodontics)	N	2	5	1	8		
		%	11.1%	8.6%	4.2%	8.0%		
Previously managed a case of medication- related osteonecrosis of the jaw	Yes	N	3	14	7	24	0.88 3	0.643
		%	16.7%	24.1%	29.2%	24.0%		
	No	N	15	44	17	76		
		%	83.3%	75.9%	70.8%	76.0%		

Discussion

The findings of this study demonstrate that a majority of dental practitioners in Tripoli, Libya possess a moderate level of baseline awareness (58.0%) regarding MRONJ and bone-modifying agents. This indicates a solid baseline level of theoretical knowledge, likely stemming from undergraduate educational exposure. However, this theoretical comprehension did not entirely align with standard defensive clinical habits. The most striking clinical contradiction identified was that while 87.0% of respondents identified surgical tooth extractions as the dominant clinical trigger for initiating MRONJ, less than half (45.0%) reported always and systematically screening for BMAs during primary medical history intake. This clinical gap exposes an at-risk patient population to unintended bone necrosis following routine surgical interventions.

This dynamic aligns closely with findings documented across several regional and international studies. For instance, epidemiologic evaluations in Saudi Arabia and the United Kingdom similarly observed that while basic awareness metrics among dentists hovered at moderate levels, comprehensive screening workflows and detailed knowledge of newly approved biological non-bisphosphonate agents (such as Denosumab or antiangiogenic therapies) were significantly diminished [12,13]. Many general practitioners continue to bind their clinical suspicion exclusively to older oral bisphosphonates, completely overlooking oncology patients receiving potent monthly subcutaneous or intravenous regimens [14].

The total absence of statistically significant links ($p > 0.05$) between overall awareness levels and professional experience or specialization implies that the knowledge deficit is an institutional issue rather than an experiential one. Dentists practicing for over a decade did not display significantly higher proficiency scores than recent graduates. This strongly indicates that relying solely on clinical exposure without continuous, structured post-graduation training is insufficient to keep pace with evolving pharmacological treatments and updated maxillofacial diagnostic protocols [15].

From a preventative standpoint, establishing structured communication between prescribing medical specialists (such as oncologists, rheumatologists, and orthopedic surgeons) and dental professionals is paramount [16]. Ideally, any patient scheduled to start potent bone-modifying regimens should undergo a thorough preventative dental evaluation to achieve oral health stability before drug administration, thereby significantly reducing the necessity for future invasive dental procedures [17].

Conclusions

This study reveals that while dental practitioners in Tripoli, Libya possess moderate theoretical awareness of MRONJ, a significant gap persists in routine screening and medical history intake. To address this, we recommend: (1) mandating standardized intake templates with explicit questions on antiresorptive and antiangiogenic medications; (2) implementing continuous education workshops on AAOMS guidelines and emerging pharmacotherapies; (3) establishing clear interdisciplinary referral pathways with prescribing physicians; and (4) expanding multicenter prospective research to build regional epidemiological registries for MRONJ across Libya.

Author Contributions

M.A.A.: conceptualization, methodology, formal analysis, writing – original draft; M.M.A.: data curation, investigation, writing – review & editing; A.K.A.: validation, supervision, writing – review & editing; N.M.J.: data curation, formal analysis, writing – review & editing; J.N.B.M.: investigation, validation, writing – review & editing; A.A.T.: data curation, supervision, writing – review & editing. All authors have read and agreed to the published version of the manuscript.

Funding

This research received no external funding.

Conflicts of Interest

The authors declare no conflict of interest or disclose any relevant financial or non-financial competing interests.

References

1. Adornato MC, Penna KJ. Medication-Related Osteonecrosis of the Jaw (MRONJ): Review of the Literature and Initial Reporting of a Severe Manifestation. *Attahadi Med J*. 2024;1(2):45-52.
2. Khan AA, Morrison A, Hanley DA, et al. Diagnosis and management of osteonecrosis of the jaw: a systematic review and international consensus. *J Bone Miner Res*. 2015;30(1):3-23.
3. Marx RE. Pamidronate (Aredia) and zoledronate (Zometa) induced avascular necrosis of the jaws: a growing epidemic. *J Oral Maxillofac Surg*. 2003;61(9):1115-7.
4. Ruggiero SL, Dodson TB, Fantasia J, et al. American Association of Oral and Maxillofacial Surgeons position paper on medication-related osteonecrosis of the jaw--2014 update. *J Oral Maxillofac Surg*. 2014;72(10):1938-56.
5. Al-Talib M, Al-Shaleh A. Knowledge and attitudes of general dental practitioners toward medication-related osteonecrosis of the jaw. *Int Dent J*. 2022;72(3):312-9.
6. Al-Maweri SA, Al-Soneidar WA, Al-Sufyani GA, et al. Knowledge and opinions of Saudi dental practitioners regarding medication-related osteonecrosis of the jaw. *Saudi Med J*. 2020;41(10):1124-31.
7. Ruggiero SL, Dodson TB, Aghaloo T, et al. American Association of Oral and Maxillofacial Surgeons Position Paper on Medication-Related Osteonecrosis of the Jaws-2022 Update. *J Oral Maxillofac Surg*. 2022;80(5):920-43.
8. Yarom N, Shapiro CL, Albrecht DE, et al. Medication-Related Osteonecrosis of the Jaw: MASCC/ISOO/ASCO Clinical Practice Guideline. *J Clin Oncol*. 2019;37(25):2270-90.
9. Fliefel R, Tröltzsch M, Kriegs-Hickman B, et al. Medication-related osteonecrosis of the jaw - A literature review and update on pathogenesis, prevention and treatment. *J Craniomaxillofac Surg*. 2015;43(6):920-32.
10. Rosella D, Papi P, Pompa G, et al. Medication-related osteonecrosis of the jaw: Clinical and practical guidelines. *J Int Soc Prev Community Dent*. 2016;6(2):97-104.
11. Vinitzky-Brener I, Lino-Granados FA, et al. Knowledge of medication-related osteonecrosis of the jaw among a cohort of Mexican dentists. *Med Oral Patol Oral Cir Bucal*. 2019;24(1):e77-83.
12. Otto S, Schreyer C, Hafner S, et al. Bisphosphonate-related osteonecrosis of the jaws – characteristics, risk factors, clinical features, localization and impact on oncological treatment. *J Craniomaxillofac Surg*. 2012;40(4):303-9.
13. Saia G, Blandamura S, Bettini G, et al. Occurrence of bisphosphonate-related osteonecrosis of the jaw after surgical tooth extraction. *Br J Oral Maxillofac Surg*. 2010;48(6):414-8.
14. Kizub DA, Mihaiescu A, Sava A, et al. Knowledge and practices of Romanian dentists regarding medication-related osteonecrosis of the jaw. *Oral Dis*. 2021;27(4):1035-42.
15. Nicolatou-Galitis O, Schiødt M, Mendes RA, et al. Medication-related osteonecrosis of the jaw: definition and best practice for prevention, diagnosis, and treatment. *Oral Surg Oral Med Oral Pathol Oral Radiol*. 2019;127(2):117-35.
16. Pichardo SEC, van Merkesteyn JPR. Medication-related osteonecrosis of the jaw: awareness and knowledge among Dutch dentists. *Int J Dent Hyg*. 2020;18(3):282-90.