

Grammatical Gender Patterns in Contemporary Arabic Medical Terminology: A Morphological Analysis of Arabic Newspaper Articles

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Abstract

The dynamics of the development of medical terminology in Arabic raise grammatical issues related to gender, specifically the distinction between masculine and feminine. The difference between morphological forms and syntactic behaviour leads to variations in gender usage in contemporary Arabic media texts. This trend marks the transformation of the lexical system, necessitating a review of the gender classification framework. Therefore, a systematic morphological and syntactic analysis is needed to explain the consistency and function of grammatical gender in modern scientific terms. This research aims to categorize the types of masculine and feminine gender in medical terms at the morphological and syntactic levels, and to describe the characteristics of gender classification in Arabic, particularly in loanwords, through a corpus-based approach that combines morphological and syntactic analysis within a unified analytical framework. This research employs a qualitative descriptive approach grounded in corpus linguistics. Data were collected from the newspapers *An-Nahār* and *Akhabarul Yaum*, then analyzed using the observation method, specifically the free conversation observation technique and the note-taking technique. Data analysis was conducted using the intralingual equivalence method and the distributional method with a top-down technique. The entire process of data collection and analysis is supported by Sketch Engine as a web-based linguistic corpus software, enabling the empirical mapping of gender usage patterns in modern Arabic journalistic discourse. The research findings indicate that morphologically, the types of *mudzakkar* are *haqiqi*, *majazi*, *lafdzi*, *ma'nawi*, and *dzati*, while the types of *mu'annats* are *haqiqi*, *majazi*, *lafdzi*, *ma'nawi*, *dzati*, and *sima'i*. The classification at the morphological level is influenced by biological sex, the presence of gender markers, gender forms in meaning, and language conventions. Meanwhile, at the syntactic level, the types of *mudzakkar* and *mu'annats* are divided into two types, namely *ta'wili* and *hukmi*, which are determined by lexical collocation. This research enriches the study of modern Arabic grammar by providing a grounded understanding of noun gender based on corpus data from medical terminology. In addition, the findings of this research can serve as a reference for Arabic language enthusiasts and speakers in consistently and accurately determining the gender of modern terms. This research also has implications for language planning and the compilation of terminology dictionaries based on empirical evidence.

Keyword: Gender Gramatical; Medical Terms; Haqiqi; Sima'iy; Dzati

INTRODUCTION

Grammatical gender is a fundamental aspect of Arabic, functioning as a binary system that divides all nouns into masculine and feminine categories. This binary classification is deeply embedded in Arabic grammar, affecting not only nouns but also adjectives, verbs, and pronouns. Gender assignment is not merely a matter of vocabulary; it is a grammatical rule that affects agreement throughout the sentence (Bettega, 2019; Muassomah et al., 2022). In classical grammar theory, the process of gender assignment is described as systematic and stable, relying on a range of morphological and semantic indicators (Setiyadi, 2024). For native speakers, recognizing and correctly applying grammatical gender is an intuitive process, but for learners and linguists, the rules and exceptions present a complex field of study (Samuel et al., 2019). This binary gender system shapes how ideas are expressed and interpreted, underscoring the importance of gender as a linguistic and cultural phenomenon in Arabic-speaking societies (AlSabbagh, 2023; Fatemi, 2024).

Morphology plays an important role as the main mechanism through which gender is marked in Arabic nouns. Morphological markers, such as the addition of feminine suffixes like *ta' marbuthah*, *alif mamdūdah*, and *alif maqshurah*, serve as visible indicators of gender assignment (Al' Arsyani, 2024; Owens, 2019). While some nouns express their gender through these clear morphological indicators, others are less transparent, requiring an understanding of lexical patterns or etymology. The evolution of the Arabic lexicon, especially with the introduction of modern terminology, challenges traditional gender marking. As contemporary fields, especially medicine, introduce new terms, understanding how gender is morphologically represented becomes increasingly important. The intersection between traditional grammar rules and the expansion of modern vocabulary is an intriguing area of linguistic research (Guellouz, 2016; Habri et al., 2022), particularly in medicine, where many new terms have emerged in recent years. The expansion of modern medical terminology in contemporary Arabic underscores the language's dynamic nature. Driven by advancements in medical science, globalization, and the need for precise communication, Arabic has absorbed numerous new medical terms from other languages, especially English, French, and Latin (Bulai, 2025). This influx brings both opportunities and challenges, as the borrowed terms must be integrated into the existing grammatical framework. The process of assigning gender to these new terms is not always straightforward, as the original terms may lack gender or follow patterns different from traditional Arabic morphology. This evolution reflects the Arabic language's adaptability but also draws attention to the mechanisms by which new vocabulary is assimilated and gendered within the language (Essa Alfaifi, 2024; Habri et al., 2022). The adaptation of Arabic to loanwords can be seen in the development and dynamics of terminology, which are intensively recorded in public discourse and mass media, especially newspapers.

Newspapers serve as an important reflection of the actual and functional use of Arabic, providing an overview of how the language adapts in real time to social and scientific changes. As a primary source of public information, newspapers often feature articles on emerging medical topics, thereby introducing and normalizing new terminology. The language used in these publications can reveal how gender assignment occurs in practice, highlighting both standardized forms and inconsistencies. Examining newspapers allows researchers to observe how medical terms are morphologically adapted and which gender-marking strategies dominate. Understanding these patterns

provides insights into the broader processes of language change and standardization in contemporary Arabic (Abdul Razak, 2023; Shafri et al., 2023).

Given the ongoing expansion of medical vocabulary, examining morphological gender patterns in modern medical discourse is becoming increasingly important. The way new terms are assigned gender, and the consistency of this assignment, can affect clarity, communication, and linguistic identity. Accurate and predictable gender marking is not just a matter of grammatical precision but also an issue of effective knowledge transfer in the medical context. The study of gender morphology in this evolving lexicon holds significance for linguists, educators, translators, and healthcare professionals. By systematically analyzing these patterns, scholars can contribute to more effective language planning and policy, ensuring that Arabic remains modern while remaining true to its grammar fundamentals.

Traditionally and structurally, Arabic adheres to a binary gender system: masculine (*mudzakkar*) and feminine (*mu'annats*). In the framework of classical grammar, as formulated by Sibawayh and continued in the classical Syntactic literature, this division is fundamental and affects the entire syntactic system, including agreement between nouns and adjectives, verbs, and pronouns (Bettega, 2019; Sibawaih, 1988). Unlike some other languages with more than two gender categories, Arabic has maintained a relatively stable dualistic opposition from the classical period to the contemporary period. Several modern linguistic studies also affirm that this system remains productive in Modern Standard Arabic (MSA), both in literary and journalistic texts. Gender in the Arabic language not only functions as a grammatical category but also as a structural mechanism that regulates syntactic and morphological relations within sentences (Alzahrani, 2023; Setiyadi, 2024). Thus, understanding the binary system of *mudzakkar* and *mu'annats* serves as the foundation for the analysis of Arabic morphology and syntax.

In Arabic linguistic literature, *mudzakkar* is often understood as the default or unmarked form (Al-'Aslily, 2018; Albar, 2021). That means, every noun is essentially assumed to be *mudzakkar* unless there is an indicator marking otherwise. This approach aligns with the theory of markedness in structural linguistics, in which one category serves as the basic form, while the other is a derivative marked morphologically. Therefore, *mu'annats* are viewed as branches or marked forms of *mudzakkar* that acquire their identity through the addition of certain markers (Albar, 2021). In contemporary linguistic practice, especially in scientific and technological loanwords, the default masculine tendency is increasingly dominant because many new terms do not undergo morphological feminization. This shows that the concept of *mudzakkar* as the basis of the gender system is not only theoretical but also reflected in the dynamics of modern Arabic vocabulary development.

Morphological markers of femininity in Arabic have been widely discussed in both classical and modern literature. The three main and most common indicators are *ta' marbūṭah* (ة), *alif maqṣūrah* (ى), and *alif mamdūdah* (ة). *Ta' marbūṭah* is the most productive and clear marker, often appearing in abstract nouns, female professions, and several anatomical terms. *Alif maqṣūrah*, which usually appears at the end of words with a long vowel -ā, also serves as an indicator of femininity in several nouns such as *ḥummā* or *kubrā*. Meanwhile, *alif mamdūdah* is often found in patterns traditionally categorized as *mu'annats* (Al-Anbariy, 1999; Hammad, 2022; Ya'qub, 1994). Literature shows that although these markers are quite systematic, there are also exceptions that are *simā'ī*

(based on usage convention) (Anis, 2016; Qanibiy, 1987). Therefore, gender analysis in Arabic cannot be separated from the identification of morphological forms inherent in the words.

In addition to the basic division of *mudzakkar* and *mu'annats*, morphological literature also develops more detailed categorizations, namely *ḥaqīqī*, *majāzī*, *lafẓī*, *ma'nawī*, and *simā'ī*. The natural or real (*ḥaqīqī*) category refers to the actual biological gender of humans and animals. In contrast, the unnatural or unreal (*majāzī*) category is used for inanimate objects or abstract concepts. *Lafẓī* emphasizes the morphological form of the word, while *ma'nawī* emphasizes its meaning or semantic reference even if its form does not clearly indicate a gender marker (Albar, 2021; Kalsum & Sari, 2021; Ya'qub, 1994). As for common usage (*simā'ī*), it refers to the determination of gender based on tradition and usage habits that cannot always be explained. This division shows that the Arabic gender system is complex and multidimensional, involving interactions among form, meaning, and morphological historical conventions (Anis, 2016; Qanibiy, 1987). Modern literature holds that this classification remains relevant for analyzing contemporary Arabic, especially given the emergence of new terms in the fields of science and technology.

One of the most distinctive aspects of Arabic morphology is the system of patterns (*wazan*) that structures words from roots into various derived forms. The *wazan* serves as a morphological blueprint, in which the root letters are inserted into a specific pattern framework, yielding different meanings while remaining related to the original root (Kosim et al., 2023; Qabawah, 2012). For example, the pattern *fa'āl* or *maf'ūl* generally indicates the tool or result of an action. This pattern system applies not only to verbs but also to nouns and adjectives, allowing Arabic to productively form new vocabulary through affixation and internal changes without losing semantic connection to its roots. Morphological structures like this demonstrate the complexity of the Arabic language, rooted in classical tradition yet still relevant in modern linguistic studies, where changes occur only through systematic pattern modifications without damaging the basic structure (Faust & Lampitelli, 2023; Karin C. Ryding, 2014). Thus, *wazan* is not merely a formal structure but a vital component that systematically connects morphology with lexical meaning in Arabic.

Determining grammatical gender in Arabic is also an important aspect, closely connected to morphology, as gender affects various forms of agreement in sentences. In Arab tradition, gender is determined by both meaning (semantic) and form (morphological). That means nouns can be treated as masculine or feminine based on their biological reference, for example, words for humans/animals or morphological indicators attached to the word (AlSabbagh, 2023). Grammatical studies find that grammatical gender is identified not only by the meaning of the word but also by certain morphological features that are generally associated with femininity, such as the *ta' marbūṭah* suffix or specific pattern changes. This system affects noun classification in syntax, especially in the agreement between adjectives and verbs, so that gender becomes a grammatical category that extends beyond a word's denotative meaning. The research also notes that although gender is regularly determined, variations persist in some Arabic dialects, demonstrating the complexity of the gender system beyond classical standards (Alenazy et al., 2024; Owens, 2019).

The adaptation of new terms, especially those derived from foreign languages, into the Arabic morphological system poses significant challenges in determining

grammatical gender, as Arabic, as an inflectional language, requires every noun to have a clear gender category. When scientific, technological, and medical terms undergo Arabization (*ta'rīb*), their gender assignment is not always immediately transparent (Habri et al., 2022; Musthofa, 2017). Modern studies show that in many cases, the masculine form is established as the default choice by integrating loanwords into existing morphological patterns without adding feminine markers. However, in certain situations, such as through analogy with Arabic derivational patterns or to achieve semantic alignment, speakers can add suffixes, such as *ta' marbūṭah*, to produce feminine forms. The productivity of this gender marking reflects the flexibility of the contemporary Arabic morphological system, which allows for the extension of traditional rules to new vocabulary. Although Modern Standard Arabic has normative guidelines for determining gender and number, actual practices across registers and dialects can lead to variations, even ambiguities, especially when foreign terms lack established conceptual equivalents (Khasarah, 2008; Owens, 2019). Thus, the integration of new lexicons demonstrates an ongoing negotiation between the stability of classical structures and modern linguistic innovations, thereby showing the resilience and dynamism of the Arabic gender system in responding to the development of science and the globalization of terminology.

The rapid development of medical terminology in the modern era has led to significant processes of lexical borrowing and Arabization in Arabic. With advances in medical science and the introduction of new concepts, technologies, and treatments, the Arabic language needs to accommodate many foreign terms, especially those from English, French, and Latin (Habri et al., 2022; Musthofa, 2017). Arabization involves adapting these terms to Arabic phonological, morphological, and grammatical patterns. This process often involves assigning the appropriate gender to borrowed nouns, which may or may not align with the gender of their source-language counterparts. The strategies used in Arabization are diverse, ranging from direct borrowing with minimal modification to the application of original morphological patterns, such as adding feminine suffixes or adjusting terms to fit existing templates (Al-Shbiel, 2017; Hadi, 2012).

The formation of medical terminology in Arabic has long been a concern for linguists, lexicographers, and language institutions in the Arab world. The literature shows that there are several main mechanisms in the formation of medical terminology, namely derivation (*al-ishtiqāq*) from Arabic root words, Arabization (*al-ta'rīb*) of foreign terms, semantic translation (*al-tarjamah/al-calque*), and composition (*naḥt*) (Khasarah, 2008; Musthofa, 2017). Derivation is widely used in terms related to physiological processes and medical conditions, such as the *masdar* form to name diseases or symptoms. Meanwhile, Arabization is more dominant in pharmacology, biochemistry, and modern medical technology, with terms originating in Latin, Greek, or English. The Academy of the Arabic Language and medical terminology institutions strive to balance the preservation of the Arabic morphological system with the need for international scientific accuracy (Djidour, 2024; Musthofa, 2017). Thus, the formation of Arabic medical terminology is not only linguistic but also epistemological, as it must accurately represent medical concepts while adhering to Arabic linguistic rules.

In terminology studies, medical terms are defined as specific lexical units used to represent concepts, procedures, or entities in the medical field with precision and systematically (Dorland, 2019; Scarborough, 2025). Unlike general vocabulary, medical terms have limited, technical, and unambiguous meanings in a professional context. The

literature emphasizes that medical terms must adhere to the principles of clarity, consistency, and conceptual interconnection within the health knowledge system. Therefore, Arabic medical dictionaries and glossaries are often supplemented with conceptual definitions rather than just translation equivalents (Dorland, 2019). These definitions help ensure that the terms are not merely transliterations, but truly represent scientifically recognized medical concepts. In this context, Arabic medical terminology serves as a medium of scientific communication, connecting clinical practice, medical education, and academic publications.

As for categorization, the literature generally groups Arabic medical terminology into several main fields, including anatomy, physiology and biochemistry, pathology/diseases, pharmacology, clinical procedures, and medical tools and technologies (Dorland, 2019). This categorization facilitates both linguistic and conceptual analysis of the terms used. For example, anatomical terms tend to be concrete and stable, whereas pathological terms often take on derivative forms that indicate processes or conditions. On the other hand, medical technology terms are more often derived from Arabic due to the rapid development of global innovation. The literature also shows that each category exhibits certain morphological tendencies in Arabic, so the pattern of term formation is not entirely random but rather follows conceptual needs and scientific conventions (Khasarah, 2008; Qabawah, 2012). Thus, Arabic medical terminology is a structured system that reflects the interaction between language, science, and international standardization.

Despite the growing number of studies on Arabic morphology and medical terminology, there is a notable lack of corpus-based research specifically examining the morphological realization of gender in medical discourse. Most existing research, as in Guellouz (2016), Muassomah et al. (2022, 2025), and Owens (2019), relies on theoretical analysis or small-scale text analysis, leaving a gap in our understanding of how gender assignment operates across a larger, more representative sample of language use. Corpus-based approaches offer the advantage of capturing authentic usage patterns, revealing how gender is actually marked in practice rather than how it is prescribed in grammar books or dictionaries. This gap is particularly significant considering the centrality of newspapers and other media in disseminating medical knowledge and terminology to the public.

Another area that has been less researched is the focused analysis of morphological patterns, rather than merely documenting syntactic agreement. Most of the existing literature, as Alenazy et al. (2024), Bettega (2019), Bettega & D'Anna (2023), and Ma'nawi et al. (2021), has focused on the phenomenon of agreement at the sentence level, neglecting how gender is embedded in the morphological structure of nouns themselves. Furthermore, limited attention has been given to the specific challenges of gender assignment in contemporary media language, where speed, innovation, and exposure to foreign influences are highly prominent. Addressing this gap is crucial for developing a comprehensive understanding of gender in modern Arabic and for providing insights into language policy, education, and translation practices in the rapidly evolving linguistic landscape.

This research addresses three main issues related to grammatical gender in Arabic medical terminology. The first issue concerns gender forms in Arabic, particularly the masculine (*mudzakkar*) and feminine (*mu'annath*) forms in contemporary medical terminology. Arabic traditionally operates within a binary gender system. However, the

rapid expansion of modern medical vocabulary, much of which is borrowed from languages without grammatical gender, raises questions about whether these new terms are consistently integrated into this system or whether they introduce irregularities. Therefore, this study examines how masculine and feminine forms are realized in medical terminology, particularly in Arabic newspapers, to determine whether the traditional gender framework remains stable despite lexical expansion. The second issue focuses on gender markers in Arabic medical terminology, specifically the morphological indicators used to signal gender in nouns. This includes examining whether gender is marked through established feminine suffixes such as *tā' marbūṭah* (ة), *alif mamdūdah* (ة), or *alif maqṣūrah* (ة), through analogical morphological patterns, or through direct borrowing of foreign terms without modification. By analyzing these markers, the study evaluates whether new medical vocabulary follows traditional Arabic morphological conventions or whether non-traditional patterns are emerging during linguistic adaptation. The third issue concerns determining gender types in Arabic medical terms, which involves classifying medical vocabulary according to established grammatical categories such as real gender (*ḥaqīqī*), metaphorical gender (*majāzī*), morphological gender (*lafẓī*), semantic gender (*ma'nawī*), intrinsic gender (*dhātī*), and conventional gender (*simā'ī*). Through this classification, the research aims to assess how contemporary medical terminology fits within Arabic's traditional gender system and whether the expansion of scientific vocabulary affects the consistency of gender assignment. Together, these three issues help evaluate the stability and adaptability of the Arabic morphological gender system and its ability to maintain grammatical coherence while accommodating the growing body of modern medical terminology.

The main objective of this study is to systematically map the forms, markers, and types of gender in Arabic, particularly in Arabic medical terminology, by analyzing a representative sample of medical terms from contemporary newspapers. Through this distribution analysis, the research aims to determine how often masculine and feminine forms appear and to uncover fundamental trends or shifts in gender assignment practices as the language evolves in response to scientific advancements. This knowledge is highly valuable to linguists, educators, and policymakers seeking to understand and guide the development of Modern Standard Arabic in specialized fields. Another important goal is to describe the precise morphological markers, such as suffixes, prefixes, or other features that indicate gender in medical terminology. By cataloguing these markers and noting any irregularities or innovative forms, this research provides detailed resources for professionals involved in dictionary compilation, translation, curriculum design, and language technology. Additionally, this study aims to analyze the most common morphological patterns in original and borrowed medical terms, identifying which patterns dominate and how they are adapted. This comprehensive analysis will contribute to a deeper understanding of morphological productivity and innovation in Arabic, supporting the development, standardization, and effective use of technical vocabulary.

This study makes a substantial contribution to contemporary Arabic morphology by offering a focused examination of gender assignment in the rapidly evolving lexical field. Although many existing studies have discussed gender in general language use, few have explored its application in scientific and technical domains, particularly medicine. By focusing on the intersection of morphology and medical terminology, this research fills an important gap in the literature and encourages further investigation into the

expansion of specialized vocabulary. Such work is crucial for developing a comprehensive Arabic morphology theory that reflects both tradition and innovation.

The enhancement of research on Arabic medical terminology is another key significance of this work. As medical advancements continue and more terms enter the Arabic lexicon, understanding how these terms are morphed will support teaching, translation, and effective communication in the healthcare environment. The findings of this study can inform lexicographers, translators, and curriculum developers, helping them standardize new terminology and promote consistency across platforms. Ultimately, this enriches the resources available to Arabic speakers and learners, ensuring that medical knowledge is accessible and linguistically coherent.

Finally, the advancement of corpus-based linguistic analysis in Arabic studies is the main contribution of this research. By using a newspaper corpus to examine real-world usage, this study demonstrates the value of a data-driven empirical approach in understanding language change. Such methodology can be applied to other fields and topics, setting a precedent for future research in Arabic linguistics. The insights gained from this work not only deepen our understanding of morphological gender but also highlight the importance of continuously updating and refining linguistic resources in response to social and scientific developments.

METHOD

This study employs a descriptive qualitative research design, supplemented by quantitative frequency analysis, to investigate in depth morphological gender patterns in contemporary Arabic medical terminology. Through detailed examination, the qualitative component explores how gender is established, marked, and adapted in medical terminology, offering deep insights into this linguistic process. The quantitative aspect systematically counts and analyses the frequencies of masculine and feminine forms and morphological markers, revealing dominant trends and regularities. Based on corpus-based analysis, this research builds a representative collection of medical and health articles from contemporary Arab newspapers, ensuring that the findings reflect authentic language use rather than prescriptive norms. This integrated approach enables the identification of emerging patterns, irregularities, and shifts in gender assignment, providing a solid foundation for descriptive insights and statistical generalizations. The results are directly relevant to ongoing efforts in language development, lexicography, and standardization within the context of modern Arab media.

The data sources for this research include both primary and secondary data. Primary data consist of medical terms in the form of words and phrases obtained directly from health and technology news articles published in two influential Arabic-language online newspapers, namely *Akhbārul Yaum* (Egypt) and *An-Nahār* (Lebanon), between March 2020 and May 2023. These two media were chosen because they hold authority in the Arab public discourse and demonstrate differences in editorial and linguistic tendencies in the application of gender grammar. As for secondary data, it includes various bibliographic sources, such as Arabic grammar books, linguistic dictionaries and encyclopaedias, medical and technological terminology dictionaries, scientific journal articles, as well as relevant findings from previous research, which are used as theoretical foundations, comparatives, and verification tools in analyzing the consistency and variation of Arabic gender grammar usage in primary data.

Data Collection Techniques

The data in this study consist of Arabic words and sentences, which are classified as quantitative or qualitative based on their linguistic characteristics (Ahimsa-Putra, 2009). The data collection process follows the stages of linguistic work, which include data provision, data analysis, and the presentation of analysis results in sequence (Sudaryanto, 1992). Data collection was conducted using the observation method, which involves observing language use in written texts and employing non-interactive, free-observation techniques, as the researcher was not directly involved in the language production process. An advanced technique used was the recording method, which involves systematically recording linguistic forms relevant to the research focus (Mahsun, 2017). To support the collection and classification of corpus-based data, this research uses the Sketch Engine software as a corpus manager and text analysis tool, enabling researchers to identify keywords, word combinations, usage patterns, and specific terminology in the online news texts of *An-Nahār* and *Akhhbārul Yaum* (Kilgarriff, 2003). Technically, the data were collected by compiling articles from both newspapers, combining them into a single file, uploading the corpus to Sketch Engine, and then classifying the data by parts of speech before further analysis in line with the research objectives.

Data Analysis Procedure

The collected data is analyzed using the intralingual matching method, which is a linguistic analysis method conducted by comparing linguistic elements within a single language system or between elements within the same language system, specifically to examine forms, types, and gender markers in Arabic and their usage in sentences in newspapers (Mahsun, 2017). The recorded data is then sorted alphabetically to facilitate classification and comparison by gender categories and their markers. Furthermore, the analysis is complemented by a distributional method that uses a top-down approach, tracing the derivational forms of a word back to its base form to reveal the morphological structure of the analyzed terms (Djajasudarma, 2010). To support corpus-based analysis, this research uses the Sketch Engine software to identify the linguistic behaviour of words, including collocation patterns and the appropriateness of medical and technological terms in the online news texts of *An-Nahār* and *Akhhbārul Yaum* (Kilgarriff, 2003). The results of the data analysis are presented using an informal method, namely through narrative descriptions using relevant linguistic terminology, to meet the principles of descriptive adequacy, explanatory adequacy, and completeness so that all research findings can be presented in detail, clearly, and comprehensively (Hadi, 2003; Mahsun, 2017).

Validity and Reliability

To ensure the validity of the findings, this study cross-verifies each extracted term against an authoritative Arabic medical dictionary at multiple stages, ensuring that each term is medically relevant and correctly morphologically classified. This process minimizes errors caused by misinterpretation or the inclusion of irrelevant vocabulary, thereby enhancing the dataset's credibility. Contextual validation is also carried out by analyzing each term within the sentence structure, ensuring that gender assignment aligns with grammatical correctness and intended meaning. Reliability is strengthened through consistent examination in morphological classification, where multiple researchers can

independently review and classify terms, resolving differences of opinion through consensus. Comprehensive documentation of classification criteria, term selection, and analytical procedures is maintained to promote transparency and facilitate replication. By integrating cross-dictionary tracing, contextual analysis, and collaborative review, this study achieves high standards of accuracy and replicability, maintaining rigorous linguistic research practices.

RESULTS AND DISCUSSION

Morphological Gender Distribution

Analysis of grammatical gender classification in contemporary Arabic medical terminology, particularly as reflected in leading newspapers, reveals the persistence and complexity of the binary gender system, masculine (*mudzakkar*) and feminine (*mu'annath*). Data shows that these gender categories are not only marked morphologically but also classified into several more nuanced types, including biological gender, the presence of gender markers, semantic gender, associative or relational gender, and conventional usage. This layered classification is found not only in traditional vocabulary but also increasingly in borrowed modern terms, reflecting both the resilience and adaptability of the Arabic grammatical system. This can be seen in the following table:

Table 1. Grammatical Gender Classification of Medical Terminology in Contemporary Arabic

No	Category	Sub-Category	Number of Terms	Percentage
1	The Form of Arabic Gender	Masculine (<i>Mudzakkar</i>)	620	72.3%
		Feminine (<i>Mu'annath</i>)	238	27.7%
2	Biological/Natural Gender	Natural or Real Masculine (<i>Mudzakkar haqīqī</i>)	50	5.8%
		Natural or Real Feminine (<i>Mu'annath haqīqī</i>)	12	1.4%
		Unnatural/ Unreal Masculine (<i>Mudzakkar majāzī</i>)	570	66.4%
		Unnatural/ Unreal Feminine (<i>Mu'annath majāzī</i>)	226	26.3%
3	Gender Marker	Morphological Masculine (<i>Mudzakkar lafẓī</i>)	598	69.7%
		Morphological Feminine (<i>Mu'annath lafẓī</i>)	232	27%
4	Form and Meaning of Gender	Masculine by Meaning (<i>Mudzakkar ma'nawī</i>)	1	0.1%
		Feminine by Meaning (<i>Mu'annath ma'nawī</i>)	5	0.5%
		Intrinsic Masculine (<i>Mudzakkar dhātī</i>)	502	58.5%
		Intrinsic Feminine (<i>Mu'annath dhātī</i>)	195	22.7%
5	Convention or Speaker Agreement	Common Usage Feminine (<i>Mu'annath simā'ī</i>)	56	6.5%

This study identifies 620 masculine medical terms (*mudzakkar*) and 238 feminine medical terms (*mu'annath*). Morphologically, the classification of gender based on biological form reveals 50 real masculine medical terms (*mudzakkar haqīqī*), 12 real feminine medical terms (*mu'annath haqīqī*), 570 unreal masculine terms (*mudzakkar majāzī*), and 226 unreal feminine terms (*mu'annath majāzī*). Based on the presence of gender markers in nouns (ism), 598 medical terms were identified as morphologically masculine (i.e., lacking feminine markers; *mudzakkar lafzī*), while 232 medical terms had explicit feminine markers (*mu'annath lafzī*). Semantically, one medical term displays a feminine marker but is exclusively used to refer to males (*mudzakkar ma'nawī*), whereas five cases of the opposite (*mu'annath ma'nawī*) were found. Based on form and semantic identity, 502 medical terms are categorized as *mudzakkar dhātī* and 195 as *mu'annath dhātī*. Finally, 56 medical terms are classified as feminine general usage (*mu'annath simā'ī*) in accordance with established usage among Arabic speakers.

It should be noted that this study found that new medical and technological terms, such as كروموسوم (*kurūmūsūmun*, 'chromosome'), البكتيريا (*al-baktīriyā*, 'bacteria'), and اللاكتوفيرين (*al-lāktūfirīnu*, 'lactoferrin'), are often seamlessly integrated into the existing gender system through processes such as Arabization (*ta'rīb*) and consistent morphological adaptation. These loanwords, even when originating from languages without a gender system or with different gender assignments, are given grammatical gender in Arabic according to established morphological or semantic criteria. The adaptation process ensures that these words can participate in standard agreement patterns, maintaining syntactic coherence in written and spoken discourse.

Overall, these findings indicate that Arabic, while maintaining its classical grammatical framework, is highly capable of normalizing and assimilating foreign terminology. The successful integration of new terms into the binary gender system reflects both linguistic continuity and innovation. This dynamic interaction allows Arabic to keep pace with global scientific and technological advancements, ensuring that new concepts can be effectively communicated within the language's grammatical structure. The ongoing evolution of gender patterns in medical and technological terminology underscores the Arabic language's dynamism and adaptability amid rapid lexical expansion.

Morphological Classification of Masculine and Feminine Terms

1. Gender Categorization Based on Biological Form

Findings indicate that the category of real masculine (*mudzakkar haqīqī*) in this data includes nouns referring to living beings with a clear biological sex or to biological entities treated as living organisms. Terms such as مُمَرِّضٌ (21) 'nurse' and جَرَّاحٌ (13) 'surgeon' are classified as *mudzakkar haqīqī* because they refer to male individuals in the context of masculine usage. Morphologically, the masculine marker is present, following the masculine pattern without the *ta' marbūtah*, *alif maqshurah*, or *alif mamdūdah* ending, so both the form and meaning are consistent as true masculine. Meanwhile, names of bacteria such as البكتيريا (5) and ديسولفوفيريوس (5) are biologically living organisms, even though they lack male-female categories like humans or higher animals. However, in biological classification, bacteria are still considered living beings, so their inclusion as *mudzakkar haqīqī* in this corpus is based on their status as organisms rather than on morphological markers alone. This shows that in health-

related discourse, true masculinity is not limited to male medical professionals but also extends to pathogenic organisms considered as living entities.

The category of real feminine (*mu'annats ḥaqīqī*) in the data shows a direct association with references to biological females or female reproductive organs. Nouns such as مَبِيضٌ (4) 'ovary' and مَبِيضٌ (4) 'vagina' clearly refer to female body organs and are therefore classified as *mu'annats ḥaqīqī* based on their biological aspect. Similarly, terms like حَامِلٌ (23) 'pregnant' and حَيْضٌ (3) 'menstruation' are directly related to the physiological condition of women and are categorized as *mu'annats ḥaqīqī* even though they do not always exhibit *ta' marbūṭah* morphologically. Here, classification does not only depend on the form of the word but also on its exclusive reference to the female body or biological experience. This shows that in the Arab gender system, biological reality can be a major factor in gender categorization, even when the morphological form appears neutral or masculine.

Moreover, the data shows forms of *mu'annats ḥaqīqī* associated with professions and biological groups, such as أَلْبَاظَةُ (7) 'female internists' and أَلْصَّيَّادَةُ (2) 'female pharmacists', which are explicitly marked with *ta' marbūṭah* as a sign of professional feminization. This shows that Arabic provides morphological mechanisms to indicate women's biological sex in social and professional contexts. Meanwhile, ميكروبات (25) 'microbes' as a plural form also represent living entities that, in certain contexts, can be treated as genuinely feminine based on their syntactic agreement as non-rational plurals. Overall, these findings highlight that the category of *ḥaqīqī* in the medical corpus reflects the relationship between language and biological reality, whether in humans, reproductive organs, or living organisms, showing a strong semantic dimension beyond mere surface morphological markers.

Based on biological classification, all data in this table fall into the category of unnatural or unreal (*majāzī*), as they do not refer to humans or animals with clear biological sexes. However, the distribution of its forms shows two main tendencies: unnatural masculine (*mudzakkar majāzī*) and unnatural feminine (*mu'annats majāzī*). In the group of *mudzakkar majāzī*, terms such as لِقَاحٌ (237) 'vaccine', سَرَطَانٌ (204) 'cancer', and كُوفِيدٌ (135) 'Covid' appear with very high frequency in the health corpus. These terms lack feminine markers, such as *ta' marbūṭah*, and are thus morphologically classified as masculine. Similarly, names like أُكْسُجِينٌ, سِيلِيْكُونٌ, and فُوتُوْبَرَاانٌ, which represent diseases, chemicals, and medications, are semantically gender-neutral but are treated as masculine in Arabic due to their unmarked morphological form. The high frequency of masculine terms in the categories of diseases and pharmaceuticals emphasizes that, in contemporary medical discourse, grammatical masculinity serves as the default for non-living entities or scientific concepts.

Conversely, in the group of *mu'annats majāzī*, some terms are morphologically marked with *ta' marbūṭah* (ة), *alif maqṣūrah* (ى), *alif mamdūdah* (اء), or regular feminine plural endings (ات), such as مَنَاعَةٌ (108) 'immunity', أُكْسَدَةٌ (33) 'oxidation', سَكْتَةٌ (22) 'stroke', بَصْمَةٌ (7) 'mark', and تَهْوِيَةٌ (5) 'ventilation'. This formal marker is the primary indicator of grammatical femininity, even when its reference is not to a living being. Anatomical terms such as رَنَّةٌ (35) 'lung' and الْأَمْعَاءُ (30) 'intestine' also tend to be feminine, either through the singular form with ة or syntactic agreement, because non-rational plurals are often treated as feminine singular in the agreement

pattern. Thus, in this data, femininity is entirely grammatical and conventional, not biological.

In short, these findings affirm that in the medical corpus, the category *ḥaqīqī* does not appear because there are no references to humans or animals with clear biological sex. All the analyzed terms fall into the category of *majāzī*, whether masculine or feminine. The dominance of *mudzakkar majāzī* among terms for diseases and chemistry indicates a masculine role as a structural neutral form. In contrast, *mu'annats majāzī* are more productive among abstract nouns, processes, and certain anatomical terms. This indicates that in contemporary Arabic, especially in medical and technological discourse, the gender system conceptually maintains the biological–non-biological division. Still, in practice, usage is dominated by metaphorical categories determined by morphological forms and lexical conventions.

2. Gender Categorization Based on Gender Markers

Based on the gender markers attached to the form of each word, the data shows a clear dominance of form-based masculine (*mudzakkar lafdzī*), which refers to nouns that do not have feminine markers such as *ta' marbūṭah* (ة), *alif maqṣūrah* (ى), *alif mamdūdah* (ء), or regular feminine plural endings (ات). Words like لِقَاحٌ (237) 'vaccine', لَتَهَابٌ (239) 'inflammation', الإنسولين (38) 'insulin', نَزِيفٌ (38) 'hemorrhage', كَارَوْتِينٌ (7) 'melatonin', أَيْدِزٌ (27) 'AIDS', لَيْزَرٌ (21) 'laser', لَيْمُونٌ (15) 'lemon', المِيلَاتُونِين (7) 'paracetamol', and الباراسيتامول (5) 'paracetamol' all fall under *mudzakkar lafdzī* because, morphologically, they do not have feminine indicators. Even with abstract nouns like لَتَهَابٌ 'inflammation' and نَزِيفٌ 'hemorrhage', their masculinity is entirely determined by their neutral-masculine derived forms in the Arabic nominal system. Similarly, scientific loanwords, such as 'insulin', 'laser', and 'paracetamol', are automatically treated as masculine because they do not undergo morphological feminization when adapted into Arabic. The high frequency of terms like لَتَهَابٌ and لِقَاحٌ emphasizes that form-based masculinity (*mudzakkar lafdzī*) functions as the unmarked (default) category in medical discourse.

On the other hand, form-based femininity (*mu'annats lafdzī*) in this data is determined by the presence of formal feminine markers. Nouns like السَّيْنِيَّةُ (14) and المرارة (72) clearly show *ta' marbūṭah* as an indicator of femininity. Similarly, عدوى (232) 'infection' and حُمَّى (58) 'fever', which end with *alif maqṣūrah*, are conventionally classified as feminine. The common feminine plural ending (ات) appears in words like بُصَيْلَاتٌ (6) 'follicles' and بَبْتِيدَاتٌ (2) 'peptides', explicitly marking them as feminine. Additionally, loanwords such as بَطَاطَا (4) 'potato' and إِنْفْلُوْزَا (30) 'influenza' show a tendency toward phonological feminization due to their long -ā endings, which in Arabic are often associated with the feminine pattern. Thus, the presence of morphological markers is the main factor in determining this category. Overall, these findings confirm that the classification of *lafdzī* is entirely based on form, not on biological or semantic meaning. All nouns that do not have a feminine marker automatically fall into the category of *mudzakkar lafdzī*. In contrast, those with clear morphological feminine indicators are placed in the category of *mu'annats lafdzī*. Frequency distribution shows that in the health and technology corpus, *mudzakkar lafdzī* is quantitatively more dominant, especially among scientific terms and modern loanwords. However, *mu'annats lafdzī* remains productive, especially with abstract nouns, medical conditions, and certain anatomical terms. This shows that, at the form-based level (*lafdzī*), the Arabic language's gender system remains

stable and consistent, supported by clear morphological markers that can be formally identified in each word.

3. Gender Categorization Based on Form and Meaning

Gender categorization based on form and meaning can be divided into two types. The first type includes nouns whose form and meaning correspond to their gender and can be understood independently, without the need for clarification from another word; this category is called intrinsic (*dzāti*). The second type consists of nouns whose form and meaning contradict in terms of gender, with gender assignment primarily based on meaning. This category is called semantic (*ma'nawī*). Both types can be found in the forms of masculine and feminine genders.

The findings indicate that the *mudzakkar dzāti* category in this data is characterized by consistency between morphological form and lexical meaning, without requiring additional explanation. Nouns such as (2) 'chromosome', (99) 'protein', and (18) 'laser' do not have feminine markers like *ta' marbūṭah*, *alif maqṣūrah*, or *alif mamdūdah*, making them masculine in form. In terms of meaning, these words refer to neutral entities (chemicals or instruments) that are treated as masculine in Arabic. Similarly, (118) 'skin' and (11) 'Parkinson's' are *mudzakkar dzāti* because they do not show feminine morphological indicators and require masculine agreement in syntactic practice. In the context of professions, (2) 'surgeon' is also an example of *mudzakkar dzāti* because its form is masculine and refers to a male professional, without the need for modification. Thus, this category shows a direct alignment between the structure of the word and its meaning, allowing gender to be immediately recognized from its form and reference. The category of intrinsic feminine (*mu'annats dzāti*) is identified by the presence of clear feminine markers and the alignment of meaning with form. Nouns such as (5) 'ventilation' and (4) 'obesity' contain *ta' marbūṭah* as a morphological indicator of femininity. Similarly, (5) 'herb' explicitly ends with *ة* and is lexically recognized as a feminine noun. In anatomy, (49) 'breast,' although it lacks a *ta' marbūṭah*, is semantically associated with women and can be treated as *mu'annats dzāti* in certain contexts. Additionally, (65) 'fever' ends in *alif maqṣūrah*, another marker of femininity in Arabic, so both its form and meaning align with femininity. In this category, gender can be identified through the morphological features and inherent meaning of the word.

Overall, these findings confirm that the *dzāti* category emphasizes the harmony between form and meaning in determining gender. *Mudzakkar dzāti* is most often found in scientific terms, general anatomy, and professions that lack feminine indicators. At the same time, *mu'annats dzāti* appears in nouns with explicit feminine markers or meanings inherently related to the concept of femininity. There is no contradiction between the form and meaning found in this data, and all terms can stand alone without further clarification to determine their gender. This indicates that, in medical discourse, the Arabic gender system maintains structural consistency between morphological forms and lexical meanings within the *dzāti* category, allowing for clear gender identification based on formal and semantic markers.

Beyond the masculine and feminine *dzāti* categories, the semantic (*ma'nawī*) category is also found in medical terminology. According to the analysis, the term *لَحْيَةٌ* /*liḥyatun* 'beard' is classified as *mudzakkar ma'nawī*. This anatomical term has a feminine marker, the *ta' marbūṭah*, which morphologically makes it appear feminine.

However, semantically, this word refers to a beard, a part of the body that is only possessed by men. Therefore, in Arabic, this word is classified as *mudzakkar ma'nawī*: it refers to males, even though its morphological marker indicates femininity. This shows that gender determination in Arabic does not always depend on the form of the word; semantic meaning plays an important role, so words that appear feminine in form can still be treated as masculine if the objects they describe are male.

In the category of semantic feminine (*mu'annats ma'nawī*), the term رَحْمٌ /*rahimun*/'uterus' appears nine times in the context of anatomy. This word is categorized as *mu'annats ma'nawī* because it refers to an internal reproductive organ found only in females, even though it does not have feminine morphological markers such as *ta' marbūṭah*, *alif maqṣūrah*, or *alif mamdūdah*. Both the category of conditions and medical actions show a high frequency. The term حَامِلٌ /*hāmilun*/'pregnant' is the most frequently used, appearing 23 times. Although its form does not show feminine features, it is treated as a *mu'annats ma'nawī* because, semantically, only women can become pregnant. Similarly, إِبْهَاضٌ /*ijhādun*/'abortion' appears eleven times, indicating a medical procedure related to pregnancy. The terms حَيْضٌ /*hayḍun*/'menstruation' and طَمْتُ /*tamtsun*/'menopause' appear three times; both are related to the female reproductive cycle and cannot be experienced by men, making them *mu'annats ma'nawī*.

Therefore, this data shows that terms in the category of *mu'annats ma'nawī* are dominated by terminology related to female reproductive functions and biological conditions, whether natural or related to medical procedures. This shows that the gender system in Arabic is influenced by both the semantic meanings associated with women's biological characteristics and grammatical forms.

4. Gender Categorization Based on Speaker Convention or Agreement

The classification results show that several terms in the fields of medicine and technology fall into the category of common usage (*mu'annats simā'iyah*). These words lack a morphological feminine marker but are conventionally treated as feminine in Arabic. In the field of medicine, within the category of anatomy, the term عَيْنٌ ('aynun, 'eye') appears 76 times, and كَبِدٌ (*kabidun*, 'liver') appears 32 times. Although neither term has a morphological feminine marker, both are considered *mu'annats simā'iyah* due to their established usage in Arabic. This shows that the biological aspects of the human body do not always align with grammatical markers; rather, linguistic consensus plays a determining role.

In the category of nutrition, several terms were identified, such as مَكْرُونَةٌ (*ma'karūnatun*, 'pasta'), which appeared once, بَطَاطَا (*baṭāṭā*, 'potato') four times, and دَجَاجٌ (*dajājun*, 'chicken meat') eight times. These three terms are classified as *mu'annats simā'iyah* because, according to Arab convention, they are considered feminine, even though their forms lack specific feminine markers. In the category of diseases, the term إِنْفُلُونْزَا (*inflūwanzā*, 'influenza') appears 30 times and مَلَارِيَا (*malāriyā*, 'malaria') nine times. Both are loanwords from foreign languages and are treated as feminine nouns in Arabic usage. In the medical locations category, the term مُسْتَشْفَى (*mustashfā*, 'hospital') has the highest frequency, appearing 142 times. Although this word contains a feminine marker, Arabic convention also categorizes it as *mu'annats simā'iyah*. The high frequency of this term highlights the central role of medical institutions in modern medical discourse.

In short, this analysis shows that the category of *mu'annats simā'iyah* in medical terminology is very diverse, encompassing anatomy (*'aynun*, *kabidun*), nutrition (*ma'karūnatun*, *baṭātā*, *dajājūn*), diseases (*inflūwanzā*, *malāriyā*), and medical institutions (*mustashfā*). This classification shows that the main factor behind gender assignment is not merely morphological forms, but rather linguistic conventions and established usage in Arabic.

Gender Patterns in Borrowed Medical Terms

Borrowed medical terms in Arabic exhibit various adaptation strategies related to gender assignment. Many foreign terms are adapted into Arabic as masculine, reflecting both the grammatical tendency to default to masculine and the structural simplicity of the borrowed form. In some cases, especially where foreign terms end with a vowel or resemble existing feminine patterns, *tā' marbūṭah* or other feminine markers are added to facilitate integration. For example, the English term 'bacteria' becomes *بكتيريا* (*bakteriyā*), retaining its phonological form but treated as feminine due to the ending and its analogy with the original pattern.

Morphological integration into Arabic patterns depends on the level of modification and the willingness of speakers and writers to adapt foreign forms. Some terms are fully Arabized, adopting the original morphological markers and conforming to established patterns, while others retain their original structure and are assigned gender only by contextual agreement. For example, *فيروس* 'virus' is treated as masculine and remains largely unchanged, while *حقنة* 'injection', from 'syringe' is adapted with *tā' marbūṭah* to align with the feminine pattern. The interaction between retention and modification highlights the flexibility of Arabic morphology in the face of linguistic innovations, balancing adherence to grammatical norms with practical considerations of phonology and usage.

Binary Gender System and Theoretical Basis

The findings of this study confirm the existence and complexity of the binary gender system, masculine (*mudzakkar*) and feminine (*mu'annath*), in contemporary Arabic medical terminology. This resilience reflects the tradition of classical grammar, as established by early Arab linguists, who consider gender as a fundamental grammatical category marked morphologically and semantically. Specifically, the layered classification in this study includes biological, semantic, associative, and conventional gender, reflecting the theoretical differences found in the works of Anis (2016), Mohammed Albar (2021), and Ya'qub (1994), which describe gender in Arabic as a matter of form and meaning. Subtle differences in the data, even among borrowed terms, illustrate the system's adaptability and its ability to accommodate new lexical items without compromising structural integrity. The clear numerical dominance of the masculine form (620 terms) over the feminine (238 terms) aligns with research showing the masculine as the default or unmarked gender in Arabic, especially for technical or abstract nouns, thereby reinforcing the theoretical understanding of gender marking in Semitic linguistics.

Arab linguists categorize Arabic's masculine and feminine forms into *haqiqi* and *majazi*, based on their biological form (Al-Anbariy, 1999). In addition, Al-Mubarrid (1970) categorizes gender in Arabic according to gender markers and their meanings into three categories: *lafdzi*, *ma'nawi*, and *ma'nawi lafdzi*. Al-'Asliliy (2018) and Ya'qub

(1994) add to the categorization of gender, interpreting it into three categories: *dzati*, *hukmi*, and *ta'wili*. As Anis (2016) and Qanibiy (1987) note, the categorization of feminines is based on convention or usage among their speakers, a phenomenon known as *sima'i*. This category does not exist in *mudzakkar* because Arabic nouns default to the masculine form. Thus, the categorization of gender in *mudzakkar* consists of eight categories: *haqiqi*, *majazi*, *lafdzi*, *maknawi*, *lafdzi maknawi*, and *dzati*. Meanwhile, the categorization of *mu'annats* includes nine categories, most of which are not much different from the *mudzakkar* categorization, with the only addition being the *sima'i* category.

Morphologically, Arabic gender is divided into four categories, each with four forms—first, the categorization of gender based on its biological form: *haqiqi* and *majazi*. Second, the categorization of gender in Arabic is based on gender markers, namely *lafdzi*. Third, the categorization of gender based on form and meaning: *ma'nawi*, *ma'nawi lafdzi*, and *dzati*. Fourth, the categorization of gender caused by the use of speakers (conventional), namely *sima'i*. In this study, Arabic medical terms were found to fall into three categories: biological forms, gender markers, and word form and meaning. Meanwhile, in the feminine forms, medical terms were found in six out of seven morphological gender categories and were spread across all existing classifications. In this study, the distinction between natural or real (*ḥaqīqī*) and unnatural or unreal (*majāzī*) gender, as well as the use of gender markers (*lafzī*), aligns well with the theoretical categorization in Arabic grammar. Basic texts note that biological gender is designated for living beings with clear sexual differentiation, while metaphorical gender is assigned to non-living or abstract entities based on convention or analogy (Ahmad Eldesoky et al., 2024; Albar, 2021). The empirical identification of 50 real masculine medical terms and 12 real feminine medical terms reflects this theoretical framework, but also shows its extension to include bacteria and microbes as 'living entities', even though they do not have sexual differentiation. Moreover, the dominance of masculine metaphorical terms for diseases, chemicals, and instruments emphasizes the system's reliance on default masculinity, supporting Albar's (2021), Guellouz's (2016), and Muassomah et al.'s (2022) assertion that masculinity is structurally neutral in Arabic. Meanwhile, the feminine remains productive for abstract nouns and body parts, confirming classical predictions about gender marking and the extension of femininity through morphological means such as *tā' marbūṭah*.

Additionally, this gender grammar analysis emphasizes the primacy of morphological markers in determining gender, validating both classical and contemporary views that form, particularly the presence or absence of *tā' marbūṭah*, *alif maqṣūrah*, or *-āt*, serve as the main indicators for gender assignment. The remarkable classification of 598 medical terms as masculine (*mudzakkar lafzī*) and 232 as feminine (*mu'annath lafzī*) emphasizes the stability of these markers, a phenomenon highlighted by Al' Arsyani (2024), Guellouz (2016), and Owens (2019). The consistent treatment of borrowed words and new technical terms as masculine unless they show clear feminine markers aligns with the theoretical understanding that Arabic morphology defaults to masculinity in the absence of clear feminization (Al-Anbariy, 1999; Ya'qub, 1994). This empirical regularity shows that although technical vocabulary is evolving, the traditional gender assignment system remains strongly entrenched, ensuring clarity and consensus in medical discourse.

As for the study's findings on intrinsic (*dzāti*) and semantic (*ma'nawī*) gender categories, they reinforce the theoretical claim about the interaction between form and meaning in Arabic gender assignment. Linguistic theory argues that nouns with corresponding form and meaning do not create ambiguity in gender assignment. In contrast, semantic gender (where meaning overrides form) allows for exceptions, especially in culturally or biologically marked contexts. The identification of data regarding terms such as لَحْيَةٌ 'beard' as morphologically feminine but semantically masculine exemplifies this theoretical peculiarity, as observed in the works of Hammad (2022), Pat-El (2025), and Ya'qub (1994). Similarly, nouns like رَحِمٌ (*rahim*, 'ovarium') are semantically feminine even though they lack explicit markers, confirming the primacy of meaning in certain lexical domains. The harmony between this theory and data highlights the Arabic language's ability to mediate between form-based and meaning-based gender assignment, especially in specialized medical vocabulary (Hammad, 2022; Owens, 2019).

Additionally, the presence of the term common usage feminine (*mu'annath simā'ī*) in this study highlights the role of linguistic consensus in shaping gender assignment, a phenomenon widely discussed in Arabic grammar literature. Terms such as عَيْنٌ 'eye', كَبِدٌ 'liver', and borrowed words like إنفلونزا 'influenza' are classified as feminine not because of morphological markers but due to entrenched usage patterns, reinforcing the theoretical observation that Arabic often follows established conventions. As noted by Anis (2016) and Qanibiy (1987), these conventions can override morphological cues, especially in fields such as anatomy, nutrition, and diseases, areas where linguistic tradition and collective agreement play a significant role. These findings illustrate the dynamic and social aspects of gender assignment in Arabic, allowing for diversity and flexibility within the framework of grammatical gender.

Borrowed Terminology and Morphological Adaptation

The insights from the study on the adaptation of borrowed medical terms directly engage in the theoretical discussion of Arabization (*ta'rīb*) and morphological integration. As predicted by Al-Shbiel (2017), Hadi (2012) and Musthofa (2017), Arabic shows a strong preference for assimilating foreign terms into its gender system, often defaulting to masculine unless the phonological or morphological profile indicates a feminine assignment. The adaptation of 'bacteria' as بكتيريا (feminine) due to the *-ā* ending, and 'virus' as فيروس (masculine) with minimal modification, exemplifies the interaction between structural regularity and pragmatic adaptation. The combination of retention and modification in gender assignment not only validates theoretical models of language contact and borrowing but also underscores Arabic's resilience and its ability to balance tradition with innovation as scientific vocabulary expands (Essa Alfaifi, 2024; Levkovych, 2024).

Implications In summary, the findings of this research strongly support the existing theoretical studies on gender in Arabic, demonstrating both continuity and adaptability in the face of lexical expansion. The consistency of the binary gender system, the dominance of form-based assignment, the pragmatic roles of semantics and conventions, and the successful integration of loanwords all illustrate the resilience of the Arabic grammatical structure described in both classical and modern studies. The dynamic interaction between tradition and innovation ensures that the Arabic language remains capable of articulating complex scientific concepts without sacrificing

grammatical coherence. These patterns affirm the theoretical foundations of Arabic and offer practical insights for lexicographers, translators, and educators seeking to standardise and expand Arabic medical vocabulary in an increasingly global context.

CONCLUSION

This study concludes that the grammatical gender patterns in contemporary Arabic medical terminology show a continuity between classical grammar traditions and modern lexical dynamics. One of the central findings is the tendency to use the suffix *alif* as a marker of femininity in loanwords, especially in the names of diseases and scientific terms derived from foreign languages. This indicates that Arabization is not only phonetic but also morphological, allowing new terms to be systematically integrated into the Arabic gender system. The determination of gender in this study is comprehensive, encompassing classification based on biological type, the presence of formal gender markers, the relationship between form and meaning, and usage conventions within the speech community. Morphologically, categorization is found based on biological type (*ḥaqīqī* and *majāzī*), based on form markers (*lafzī*), based on the correspondence between form and meaning (*dzātī* and *ma' nawī*), and based on linguistic common usage (*simā'ī*). The data distribution shows the dominance of the *majāzī* and *lafzī* categories, which affirm *mudzakkar* as the unmarked form in the Arabic nominal structure. At the same time, *mu'annats* are determined by formal indicators or usage habits. Thus, loanwords in the field of medicine demonstrate a high level of adaptability to Arabic patterns and rules, particularly in gender grammar, allowing for the integration of global terminology without disrupting the morphosyntactic coherence of contemporary Arabic.

Based on the findings of this study, it is hoped that this research can serve as a reference for scholars and Arabic speakers in consistently and accurately determining the gender of modern terms. Additionally, this research will assist speakers, learners, and observers of Arabic in correctly applying these gender differences in sentence structure. This research also enriches the study of modern Arabic grammar by providing a corpus-based understanding of noun gender in medical terminology. Moreover, this research has implications for language planning and for the development of terminology dictionaries grounded in empirical evidence.

This study is limited to the examination of gender in Arabic at the morphological level, specifically focusing on medical terminology found in Arabic-language newspapers. However, this study does not cover all the complex aspects of Arabic grammatical gender. Therefore, future research should be expanded to include gender analysis at the syntactic and morphosemantic levels, as well as phonological and sociocultural studies. Subsequent studies should also consider sociolinguistic and pragmatic approaches, as well as critical discourse analysis, to examine how gender is used to construct specific representations of other public issues. In this way, future research is expected to expand the scope of Arabic gender grammar studies and deepen our understanding of gender dynamics across medicine, technology, and other rapidly evolving domains.

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