



Third Molar Agenesis and Infertility: Evaluating a Persistent Myth Through Developmental Biology, Genetics, and Evolution

Chunru Xu & Yuanyuan Zhang

Wake Forest Institute for Regenerative Medicine, Wake Forest School of Medicine, Winston-Salem, NC 27101, USA

Correspondence: Yuanyuan Zhang, MD/PhD, Wake Forest School of Medicine, Email: Yuanyuan.Zhang@wfusm.edu

ABSTRACT

The congenital absence of wisdom teeth (third molar agenesis) is among the most common developmental variations in humans, affecting approximately 23% of the global population. Third molar agenesis has been attributed to both genetic and evolutionary factors and is generally regarded as a normal variation in dental development rather than a pathological condition. Despite its prevalence, a persistent folk belief suggests that individuals born without wisdom teeth may be predisposed to infertility. Although this legend appears in various cultural traditions and contemporary online discussions, no scientific evidence currently supports a direct association between isolated wisdom tooth agenesis and impaired reproductive capacity. This commentary examines the biological plausibility of this claim through current understanding of odontogenesis, developmental signaling pathways, and reproductive biology. While several genes implicated in tooth agenesis, including PAX9, MSX1, AXIN2, WNT10A, and EDA, participate broadly in embryonic development, published studies have not demonstrated a relationship between isolated third molar agenesis and infertility. We discuss potential origins of this myth, including extrapolation from rare syndromic disorders affecting multiple organ systems and misunderstandings of developmental genetics. Finally, we outline future research directions that may elucidate shared developmental pathways between craniofacial and reproductive tissues. Current evidence indicates that congenital absence of wisdom teeth should be regarded as a common developmental trait and not a predictor of reproductive health.

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Introduction

The third molars, commonly known as wisdom teeth, are the most frequently missing teeth in humans. Recent systematic reviews estimate that approximately 20% to 25% of individuals worldwide are congenitally missing one or more third molars. Furthermore, substantial variation exists among geographic regions and ethnic groups, suggesting contributions from both genetic and evolutionary factors [1, 2]. Throughout human history, visible physical traits have often been linked to broader aspects of health and reproductive fitness. One such persistent belief proposes that individuals born without wisdom teeth may be more likely to experience infertility. Although this claim occasionally appears in popular culture, social media discussions, and anecdotal reports, it has rarely been evaluated from a scientific perspective. The present commentary explores whether current evidence from developmental biology, genetics, den-

tistry, and reproductive medicine supports a connection between wisdom tooth agenesis and infertility.

Developmental and Genetic Basis of Third Molar Agenesis

Tooth development is a complex biological process regulated through reciprocal interactions between oral epithelial and neural crest-derived mesenchymal cells. These interactions involve several highly conserved signaling pathways, including WNT, BMP, SHH, FGF, and EDA signaling networks that collectively regulate tooth initiation, morphogenesis, and maturation [3-5]. Numerous genes have been implicated in tooth agenesis, including PAX9, MSX1, AXIN2, WNT10A, EDA, EDAR, and EDARADD. Pathogenic variants or polymorphisms within these genes may contribute to hypodontia, oligodontia, anodontia, or isolated third molar agenesis. Third molars appear particularly susceptible to developmental variation because they are the most

distal teeth in the dental arch and the last permanent teeth to develop [3, 4, 6]. From an evolutionary perspective, increasing prevalence of third molar agenesis has been interpreted as part of a long-term reduction in jaw size and dentition complexity in modern humans. Dietary shifts decreased masticatory demands, and developmental adaptations may have reduced the necessity of third molars over evolutionary time [1, 2, 7]. Consequently, isolated third molar agenesis is widely regarded as a normal developmental variant rather than a disease state.

Is There a Biological Relationship Between Wisdom Teeth and Fertility?

At present, there is no direct clinical or epidemiological evidence demonstrating that isolated third molar agenesis is associated with increased infertility rates, reduced fecundity, diminished ovarian reserve, altered sex hormone levels, impaired spermatogenesis, or adverse reproductive outcomes. Indeed, despite both conditions being relatively common in the general population, published studies have not identified a meaningful association between wisdom tooth agenesis and reproductive dysfunction.

From an embryonic-developmental perspective, odontogenesis arises from reciprocal interactions between the ectoderm and neural-crest-derived ectomesenchyme [5, 8]. By contrast, testicular development and spermatogenesis predominantly rely on the migration and differentiation of mesoderm-derived genital ridges and primordial germ cells [9]. Accordingly, no established developmental mechanism currently supports a causal relationship between odontogenesis and reproductive function.

Although in rare syndromic conditions such as ectodermal dysplasia, patients may concurrently present with tooth agenesis, hypotrichosis, sweat-gland dysfunction, and reproductive-system anomalies, these multisystem manifestations stem from systemic defects in genes including *EDA*, *EDAR*, or *TRAF6*, rather than from the symptom of third-molar agenesis itself [10].

Furthermore, available published literature indicates no significant sexual dimorphism in the pattern or severity of third-molar agenesis; that is, the phenotypic presentation and prevalence of absent wisdom teeth do not differ significantly between males and females. If third-molar agenesis were strongly associated with male-specific fertility impairment, one would expect to observe divergent genetic burden or phenotypic distribution among male populations. Existing

data, however, do not support this hypothesis [11].

Nevertheless, the question is biologically intriguing because developmental pathways involved in odontogenesis also participate in embryonic development of numerous organ systems. Signaling pathways such as WNT, BMP, and FGF regulate both craniofacial development and reproductive organogenesis. Abnormalities in these pathways can affect multiple tissues simultaneously [3, 5, 12-15].

This shared developmental architecture provides a theoretical rationale for exploring potential links between dental traits and reproductive biology. While current clinical and epidemiological studies provide no support for an association between isolated third molar agenesis and infertility, future large-scale genetic and population studies may further clarify whether subtle shared developmental pathways influence both traits. At present, however, the available evidence strongly supports the conclusion that isolated third molar agenesis represents a normal developmental variation rather than a marker of impaired reproductive potential.

Potential Origins of the Legend

One plausible explanation for the persistence of this belief is the conflation of isolated wisdom tooth agenesis with rare syndromic developmental disorders. Certain inherited developmental syndromes involve severe tooth agenesis alongside abnormalities of ectodermal tissues, endocrine systems, or other organs. Examples include forms of ectodermal dysplasia and disorders involving WNT-related developmental pathways. In rare cases, reproductive abnormalities may occur as part of these broader syndromes [3, 4]. Over time, observations from such uncommon conditions may have been generalized incorrectly to healthy individuals missing only one or more wisdom teeth. Another possible explanation arises from evolutionary interpretations. Physical traits associated with maturation have historically been viewed as indicators of reproductive fitness. Because wisdom teeth typically emerge during late adolescence and early adulthood, their absence may have acquired symbolic significance that became incorporated into folklore regarding fertility [16].

Future Research Directions

Although current evidence does not support the legend, several important scientific avenues remain worthy of investigation. Future studies could investigate whether shared genetic determinants influence both dental development and reproductive function, and whether genome-wide association analyses can identify overlapping genetic networks. Additional research may clarify whether developmental signaling pathways involved in odontogenesis also play roles in reproductive tissue development and homeostasis.

Furthermore, large population-based datasets may provide sufficient statistical power to detect subtle associations that smaller studies have been unable to identify. Large-scale biobank datasets and genome-wide association studies (GWAS) may provide opportunities to evaluate potential correlations between dental developmental traits and reproductive phenotypes across diverse populations. Advances in genomics, transcriptomics, systems biology, and developmental research now offer unprecedented opportunities to address these questions systematically and rigorously.

Conclusions

The belief that individuals born without wisdom teeth are predisposed to infertility remains unsupported by scientific evidence. Third molar agenesis is a common developmental trait with well-established genetic and evolutionary foundations. Although several developmental pathways influence both craniofacial and reproductive biology, no studies have demonstrated that isolated absence of wisdom teeth predicts reproductive dysfunction. The belief likely originated from misunderstandings of developmental genetics and extrapolation from rare syndromic disorders affecting multiple organ systems. Until robust clinical evidence suggests otherwise, wisdom tooth agenesis should be viewed as a normal variation of human development rather than a marker of infertility.

Declarations

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