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The Role of Advanced Dry Manicure Techniques in Improving Nail Health and Service Quality

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Abstract

The article examines the role of advanced dry manicure techniques in reconceptualizing nail services as an intervention with demonstrable health-promoting potential and controllable quality parameters. The combination of rapid market growth, the high prevalence of onychopathies, and persistent infectious and chemical risks associated with classical wet manicures and inadequate hygiene in salon environments underscores the relevance of the study. The aim of the work is a theoretical and analytical substantiation of the potential of dry manicure to reduce the overall risk profile and enhance the predictability of aesthetic outcomes. The novelty lies in a risk-oriented synthesis of data from dermatology, microbiology, toxicology, occupational health, and market analytics, which enabled the description of advanced dry manicure as a technological standard that disrupts the chain of water, maceration, unstable permeability, and infectious risk. It is shown that abandoning water maceration, implementing multilevel antisepsis, standardized hardware, and combined protocols, as well as restorative care, contributes to the preservation of barrier structures, reduction of microtraumatization, stabilization of the interaction between the nail plate and coatings, and the formation of sustainable client loyalty while simultaneously decreasing occupational risks for technicians. The article will be helpful to nail service technicians, salon managers, training center methodologists, and specialists in related dermatological and hygiene-oriented fields.

Keywords: *Dry Manicure, Nail Service, Onychomycosis, Infection Control, Hardware Techniques.*

INTRODUCTION

The contemporary nail service market is expanding and becoming more complex. According to industry reviews, the nail salon segment is expected to nearly double within the next decade, while competition is shifting from simple aesthetics to demonstrable safety and predictable procedural quality. A systematic review of studies on salon workers has shown that technicians are regularly exposed to volatile organic compounds, ultraviolet radiation, and delicate particulate matter, and that in 71% of salons, insufficient ventilation and chemical levels approaching or exceeding sanitary benchmarks have been identified [1]. At the same time, the consumer side of the market is equally demanding: a survey by the professional publication Cosmetics Business found that 92.8% of clients, when choosing products and procedures, primarily focus on hygiene, health benefits, and personal safety rather than traditional decorative characteristics [2].

Analytical reports on the aesthetics industry record the simultaneous growth of market volume and the intensification of consumer skepticism: clients are willing to pay a premium for procedures that demonstrate real effectiveness and transparent safety standards [3]. Against this backdrop, manicure is ceasing to be an exclusively cosmetic service. It is increasingly regarded as an intervention into the structure of skin and nail that must rest on evidence-based dermatology and carefully designed prevention of complications.

From a dermatological standpoint, nail services operate on an anatomical structure with a high baseline prevalence of pathology. The review by Leung et al. demonstrates that onychomycosis remains one of the most frequent disorders of the nail apparatus, accounting for up to 50 % of all nail diseases, with an overall prevalence of approximately 5.5 % in the general population and an increase in frequency up to 35 % in older age groups [4]. At the same time, analyses of the consequences of water maceration in classical wet manicure indicate that warm baths may become reservoirs of pathogens: Pseudomonas aeruginosa and dermatophytes readily colonize aqueous environments, stable biofilms form, and moisture and microtrauma promote the development of onychomycosis and inflammatory processes in periungual tissues [5]. A study analyzing inspection reports from the

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Texas state regulator found that more than one-third of recorded violations in salons were related to inadequate disinfection of instruments and footbaths, and that, out of 225 inspected establishments, more than 80 received sanctions specifically for non-compliance with sanitary requirements [5].

In parallel, epidemiological and risk-oriented investigations of working conditions show that even when regulatory limits for the concentrations of most chemical substances are formally met, a substantial proportion of technicians (60 % in the informal sector and 52 % in the formal sector, according to a sample from Johannesburg) report symptoms associated with exposure to nail service products, while the calculated carcinogenic risk for benzene and formaldehyde exceeds threshold values used by the United States Environmental Protection Agency [6]. Taken together, this creates a demand not merely for intensified control, which depends heavily on the human factor, but for technological modernization of the procedures themselves, in which the reduction of infectious and chemical risks is embedded in the methodology as an intrinsic property.

Within this logic, dry manicure is viewed as a new technological standard, in which abandoning water maceration and focusing on dry tissues enable simultaneous protection of cutaneous barrier structures and control of the outcome quality. In the professional literature, dry manicure is understood as a comprehensive treatment of the nail plate, cuticle, and periungual folds without preliminary soaking, using antiseptic protocols, keratolytic agents, and precise instrumental techniques that minimize trauma. Advanced dry manicure techniques include hardware and combined protocols with multilevel adjustment of speed and pressure, the selection of atraumatic bits with rounded tips, localized filing without excessive thinning of the plate, and dosed excision of surplus tissues; these protocols incorporate standardized stages of antisepsis, sterilization, and individualized assessment of the condition of the nail apparatus. Thus, advanced dry manicure techniques form a promising model in which improved nail health, reduced occupational and infectious risks, and enhanced service quality are not mutually exclusive.

MATERIALS AND METHODS

The study of the role of advanced dry manicure techniques in improving nail health and service quality is designed as a theoretical and analytical work based on the targeted selection and synthesis of 11 sources, including systematic reviews of working conditions in the nail service sector [1, 11], industry and consulting reports on market transformation and consumer expectations [2, 3], dermatological and microbiological research on the pathogenesis of onychopathies and the consequences of water maceration [4, 5, 8], toxicological and pharmacokinetic models of nail plate permeability [7, 9], as well as regulatory and expert recommendations on the prevention of infections during pedicure and manicure procedures [6, 10]. The material was formed according to the principle of maximal representativeness of the key links in the chain working conditions, dermatological and microbiological risks, consumer behavior, regulatory framework, which made it possible to compare empirical data on morbidity and technician exposure with the market demand for safety and health-enhancing effects of the service, as well as with formal requirements for hygiene and risk management in salon environments [1–3, 6, 10].

Methodologically, the work relies on several complementary approaches. First, a narrative and partially systematic review of the literature was conducted in three focal areas: (1) the epidemiology and clinical presentation of the most frequent lesions of the nail apparatus, primarily onychomycosis, with an emphasis on the role of microtrauma and moist environments [4, 5, 8]; (2) assessment of chemical and carcinogenic risks for nail service technicians in different organizational contexts [1, 6, 11]; (3) models of nail permeability and framework approaches to the evaluation of systemic exposure during the use of cosmetic formulations [7, 9, 10].

Second, a comparative structural analysis of wet and dry manicure protocols was performed, in which data on the microbiological and toxicological consequences of water maceration [5, 8] were juxtaposed with contemporary recommendations on minimizing contact with shared water reservoirs and standardizing antisepsis [10], as well as with industry trends toward hygiene-centered, evidence-based service provision [2, 3].

Third, a risk-oriented synthesis was used: based on heterogeneous quantitative and qualitative indicators from different studies [1–8, 11], a conceptual model of advanced dry manicure was constructed as a technological intervention that simultaneously modifies the profile of infectious, chemical, and mechanical risks and redistributes the emphasis in quality management of the service.

RESULTS AND DISCUSSION

In the context of the previously outlined hygiene and dermatological risks, the classical wet manicure is a sequence of procedures that involves soaking the hands in warm water, macerating the stratum corneum, and subsequently aggressively excising softened cuticle and fragments from the periungual folds. Hydration of the nail plate with this approach leads to swelling, changes in permeability and microstructure: experimental pharmacokinetic models demonstrate that the combination of water and keratolytics induces keratin swelling, formation of micropores, and enhanced diffusion of small molecules through the nail, which on the one hand is used for drug delivery, but on the other hand reduces the predictability of interactions between the plate and cosmetic formulations and renders it more vulnerable to mechanical damage [7].

The aqueous component itself constitutes an additional weak link: studies conducted in salons with whirlpool footbaths revealed the presence of nontuberculous mycobacteria in 97 % of the examined baths and a relationship between skin contact with such an environment and the development of furunculosis, thereby demonstrating how the combination of maceration and microtrauma can transform a care procedure into the starting point of an infectious process [8].

Against this background, dry manicure can be regarded as an attempt to technologically disrupt the chain of water, maceration, unstable permeability, and infectious risk. In dry protocols, the refusal of soaking is compensated by a combination of skin antisepsis, dosed use of keratolytic agents, and precise mechanical treatment of the plate, cuticle, and folds without prior maceration, which makes it possible to work with tissues in their natural state of hydration and to reduce unpredictable fluctuations in nail permeability, parameters that are significant from the standpoint of systemic and local toxicological evaluation of cosmetic ingredients [9].

At the same time, the orientation toward water-free methods aligns well with current recommendations for infection prevention in hand and foot care, which emphasize the necessity of minimizing contact with shared water reservoirs, rigorous disinfection of equipment, and careful control of all procedures involving microdamage to the skin, especially in clients with increased susceptibility to infections [10].

Advanced variants of dry manicure are characterized not only by the rejection of water as such but also by a higher degree of individualization and standardization. The technician selects configurations of bits, speed modes, and movement trajectories, taking into account nail thickness and curvature, cuticle type, and the presence of subclinical damage, thereby limiting tissue removal to non-cellular structures and preserving the functional barrier. A large-scale review of studies on working conditions in the nail service sector shows that, in the absence of formalized hygiene and technical protocols, significant gaps persist between recommendations and actual practice, and interventions aimed at implementing standardized procedures are considered a key resource for reducing risks for both technicians and clients [1]. Data from a cross-sectional survey of salon workers in a significant metropolis indicate that, despite the high prevalence of manicure and pedicure services, the use of personal protective equipment, systematic disinfection, and documented standards remains fragmentary, underscoring the need not only to change the instrumental repertoire but also to integrate clear, reproducible safety protocols and preventive care into advanced dry manicure as an inherent component of the service [11]. A comparison of dry and classical manicure is presented in Figure 1.

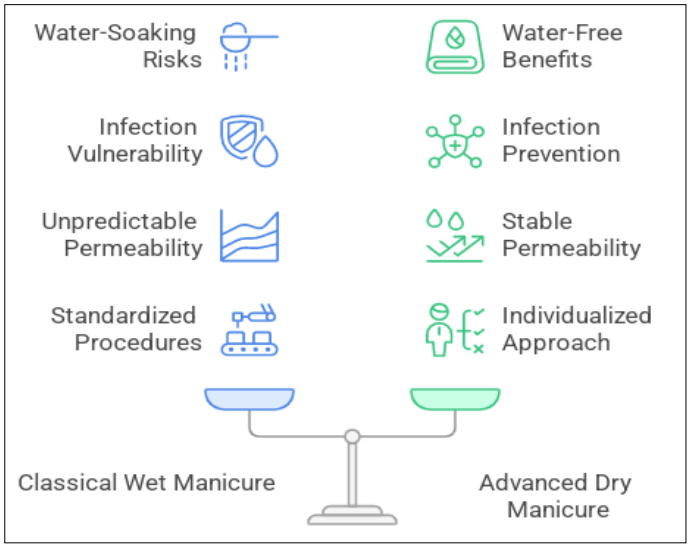

Fig. 1. Comparison of dry and classical manicure

Advanced dry manicure acts on the nail apparatus more selectively and gently than classical methods based on maceration and rough excision of softened tissues. Working on dry skin allows abandoning deep cuticle removal, limiting intervention to the elimination of already detached keratinized layers. As a result, the continuity of the periungual barrier is preserved, the likelihood of tears and ripping of thin skin areas at the base and sides of the nail decreases, and the number of hangnails, microcuts, and subsequent inflammatory reactions is reduced. The technician works not against the anatomy but in accordance with it: cutting lines become superficial and controllable, while the bulk of protective tissue continues to perform its barrier function, limiting the penetration of irritant and sensitizing substances into deeper structures.

The abandonment of water-induced nail plate swelling in dry protocols fundamentally alters its interaction with instruments and coatings. The nail retains its actual thickness, rigidity, and configuration, enabling the technician to apply pressure more precisely, select appropriate abrasive bit grades, and limit the depth of mechanical treatment. This reduces the risk of chronic plate thinning, longitudinal ridging, and zones of increased fragility. The absence of sharp fluctuations in hydration stabilizes the microstructure of keratin; the coating is applied to a relatively unchanged surface, making it less prone to lifting and chipping. At the same time, situations in which excessively thinned or traumatized areas create conditions for penetration of fungal or bacterial flora become less frequent; fewer injuries mean a diminished need for contact with blood and damaged tissues, and the exclusion of shared water baths removes one of the key reservoirs of potential infection in the salon environment.

A completed advanced dry manicure is not confined to mechanical treatment alone, but incorporates elements of restorative and maintenance care. The use of therapeutic base coats and strengthening systems enables compensation for pre-existing nail plate damage, redistribution of mechanical

load, and reduced flexing and delamination at the free edge. Targeted application of oils and serums to the cuticle and periungual skin promotes restoration of the lipid layer, softens the interface between nail and skin, and decreases the tendency to fissures and microinflammation. When these procedures are supplemented with individualized recommendations for at-home care between visits, a continuous model of nail apparatus management emerges: the in-salon correction sets the vector, while regular use of recommended products at home maintains the achieved effect, reduces the frequency of exacerbations, and stabilizes the condition of the nails and surrounding tissues at a more favorable level. The advantages of advanced dry manicure are shown in Figure 2.

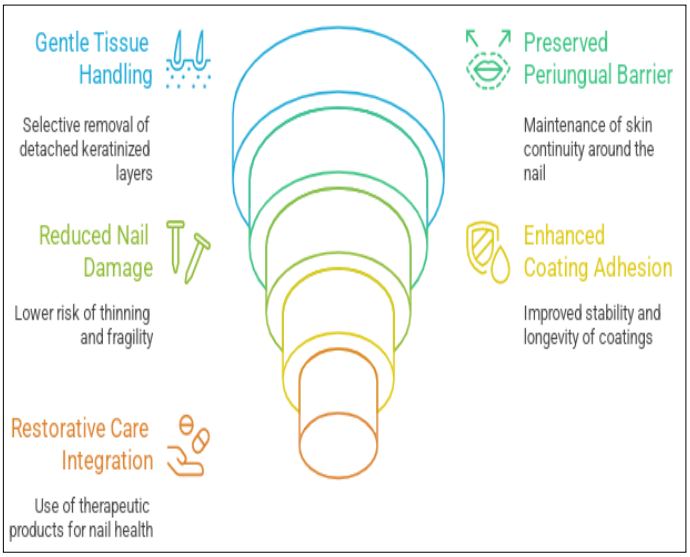

Fig. 2. Advantages of advanced dry manicure

The shift from traumatic, unpredictable methods to advanced dry manicure affects not only the condition of the nail plate and periungual tissues but also the visual aspect of the service. Working on dry surfaces allows the cuticle to be lifted and treated gently, allowing a clean, straight edge without the possibility of tearing or cutting too much while allowing the coating of the nail to be applied almost on the cuticle line with no flooding or broken edges and applied with a uniform thickness across the length of each nail, therefore improving the overall appearance of the hand. The line of demarcation between the coating and the natural nail plate moves gracefully and predictably down the nail as it grows out, allowing the manicure to appear more freshly manicured for a longer period of time and the final product to be perceived as more finished by the client.

At the same time, the subjective experience of the procedure itself changes. The rejection of coarse excision of softened tissues in favor of dosed hardware and combined techniques substantially reduces pain intensity: sharp sensations in the matrix zone disappear, the likelihood of accidental cuts decreases, and post-procedural throbbing or burning is absent. Clients perceive manicure not as an inevitable source of stress, but as a controlled, technological manipulation with transparent logic and a clearly understood sequence of steps. For the technician, advanced dry manicure relies on robust protocols with clearly defined stages, device settings, and criteria for completion at each step; this reduces variability of outcomes, enables more accurate prediction of appointment duration, and makes work quality less dependent on subjective factors such as fatigue or mood. In a salon employing multiple specialists, such standardization facilitates training, creates a unified level of performance, and diminishes contrasts between different technicians, thereby increasing the consistency of brand perception.

The combination of a cleaner, longer-lasting aesthetic result with enhanced physical and psychological comfort is reflected in client loyalty and satisfaction. The number of situations in which coatings must be redone due to chipping, lifting, or painful consequences of traumatic treatment decreases; the need for conflict resolution and financial compensation is reduced, and each procedure strengthens trust in the technician and the salon as a predictable and responsible partner in hand care. Clients are more readily accepting of recommended intervals between visits and extended care protocols, return more frequently to familiar specialists, and are more inclined to recommend the service to their social circles. Consequently, advanced dry manicure becomes not only a safer technology but also an instrument for building a stable core client base in which subjective comfort, objective quality, and a sense of care intertwine into a single, easily recognizable model of high-level service.

The aforementioned effects of advanced dry manicure on nail health and service quality are realized through a fairly distinct set of techniques, each aimed at reducing trauma and increasing the predictability of outcomes. The central element is hardware treatment of the periungual area: the technician works on dry skin with bits of different shapes, sequentially using elongated flame-shaped burs to lift and open the cuticle pocket, conical and cylindrical bits for meticulous cleaning of the surface at the base and along the sides of the nail, and then small spherical bits for gentle buffing and polishing of the folds. Rotation speed, direction of movement, and degree of pressure are selected individually based on skin thickness, degree of hyperkeratosis, and client sensitivity, thereby limiting removal to detached and keratinized tissues without damaging the living matrix or creating unnecessary microcuts. Strict sequencing of steps is also essential: first, access and visual control are established; then targeted cleaning is performed; and only afterwards is final leveling and smoothing of the relief carried out.

Another key technique is a combined manicure, in which hardware treatment is complemented by minimal use of scissors or nippers. The device performs the main work of separating and thinning keratinized tissues. At the same time, cutting instruments are used only in a highly targeted manner to remove areas that have already been fully lifted and are safe for excision. This approach is particularly appropriate for clients with dense, overhanging cuticle and for those transitioning from a classical wet manicure to gentler protocols. The cutting line thereby becomes cleaner

and more geometrically precise, while the risk of injuring living tissue is markedly reduced. Gentle preparation of the nail plate complements this model: instead of aggressive filing, soft abrasives with a limited number of passes are used, and the coating's adhesion is enhanced through chemical surface preparation with dehydrators and primers. This allows the nail to retain its original thickness even with regular coating wear, reducing the occurrence of cracks, ridges, and heightened sensitivity.

The final stage of advanced dry manicure is also structured as a therapeutic phase rather than a purely formal conclusion. After hardware treatment and coating application, the periungual skin is further polished with soft bits or buffers to smooth irregularities and microrelief, reducing the risk of snagging and fissures. Moisturizing and reparative oils and creams, appropriate to the type of skin and nail, are massaged into the skin and cuticle to support the lipid barrier, reduce transepidermal water loss, and increase the elasticity of the tissue around the nail plate. Client education is an important aspect of treatment, and recommendations may be made for home care, product selection, frequency of use, and treatment intervals. Thus, the technique ceases to be a one-time manipulation and becomes part of a long-term, structured strategy for maintaining the health of the nail plate and periungual skin, thereby enhancing both the medical and service potential of the described approach. The advanced dry manicure sequence is presented in Figure 3.

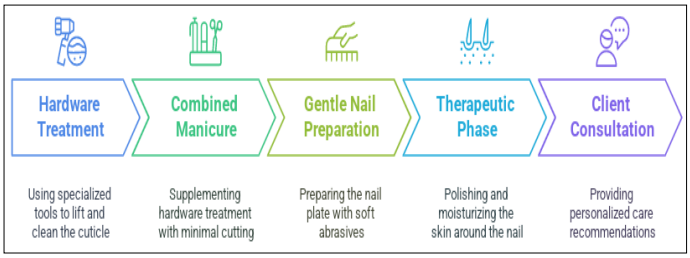

Fig. 3. Advanced Dry Manicure Sequence

An advanced dry manicure imposes significantly higher demands on the technician than classical methods; therefore, systematic professional training is the starting point. Surgical specialists must be familiar with the structure of the nail and the anatomy of the skin beneath the nail at the level of the functional units of the matrix, nail bed, cuticle, periungual folds, and the vascular supply and nerve distribution. A failure to appreciate these would impedethe correct assessment of the depth of intervention and the early diagnosis of borderline conditions. Conscious control of the hardware component is equally crucial: the technician must not only mechanically master different bit shapes, but also understand how changes in speed, direction, and vector of pressure affect the tissues. Practicing techniques on various types of nail plates and cuticles, including thin, fragile, and delamination-prone ones, becomes an obligatory stage of training rather than an optional addition.

However, individual skill alone is insufficient without strict safety and hygiene protocols. Advanced dry manicure is embedded in a multilevel control system that ranges from initial cleaning and disinfection of instruments to complete sterilization and proper storage. Rational consumption of disposable materials (especially abrasives, gloves, and cleaning wipes) minimizes the risk of cross-infection and eases the operation of sanitary services. The algorithm for action in the event of cuts, microtrauma, or suspected infection is reduced to a single instruction: switch to antiseptic management mode. The following steps should be taken: keep a record of the incident, and if necessary, see a doctor. Without this, even a technically flawless procedure loses its value due to fundamental safety vulnerabilities.

The next level of salon maturity is associated with the introduction of clear regulations and standard operating procedures. Advanced dry manicure lends itself well to formalization: the service can be decomposed into sequential stages and codified as step-by-step checklists specifying device parameters, instrument sets, products used, and criteria for transitioning to the next step. A separate block comprises rules on contraindications, under which the technician is obliged to refuse the procedure or propose an alternative care format; this helps establish a culture of responsible refusal that protects both client and specialist. Regular internal quality control, analysis of typical errors, and short training sessions within the team help maintain a consistent performance level even when a salon employs technicians with varying lengths of service and initial experience.

On this basis, the business effect of implementing advanced dry manicure manifests relatively quickly and on several levels. Well-structured technologies, reliance on anatomy and hygiene, and predictable aesthetic outcomes create in clients the perception of a modern, safe, and thoughtfully designed service that favorably differentiates the salon from practices where everything revolves around rapid color coverage. This enables positioning the service as premium, not only because of its external effects, but also because of demonstrable advantages for nail and skin health, and allows the formulation of specialized complexes, such as restorative or preventive manicure. Simultaneously, the number of conflicts, complaints, and unplanned reworks decreases, thereby reducing direct and indirect costs; the resources thus freed can be directed toward service development, training, and improvement of client communication.

CONCLUSION

The data obtained in the study demonstrate that advanced dry manicure techniques form a qualitatively different technological standard in nail services, simultaneously responding to market demand for demonstrable safety and to a dermatologically justified approach to the nail apparatus. Against the background of the high prevalence of onychopathies, persistent infectious and chemical risks associated with classical wet manicure and the use of shared water reservoirs, as well as regularly documented violations of sanitary requirements in salons, the abandonment of water maceration and the transition to working on dry tissues make

it possible to disrupt the vulnerable chain water, maceration, unstable permeability, infectious risk.

Embedding multilevel antisepsis, hardware and combined treatment with individualized selection of bits and settings, gentle preparation of the nail plate, and components of restorative care into dry manicure protocols transforms the procedure from a predominantly decorative practice into a structured intervention that protects barrier structures, reduces the likelihood of microtrauma, stabilizes interactions between the nail and coatings, and diminishes potential exposure to pathogens and irritant agents. As a result, dry manicure emerges as a more technologically and hygienically predictable model, combining improved condition of the nail plate and periungual tissues with reduced occupational and infectious risks for both technician and client.

At the same time, the following has been identified: the effectiveness and durability of advanced dry manicure depend directly on the level of professional training of the specialist and the degree of protocol formalization at the salon level. An in-depth understanding of the anatomy and functional zones of the nail apparatus is required, and the hardware technique must be managed deliberately. Strict adherence to multistep procedures of disinfection and sterilization, algorithms for responding to microtrauma and signs of possible infectious processes, as well as the implementation of standard operating procedures, checklists, contraindication rules, and regular internal quality control, is essential for advanced dry manicure to become part of a comprehensive system of safety and service quality management.

At the level of client experience, this model provides a cleaner and more durable aesthetic result through reduced pain load and post-procedural discomfort, thereby fostering increased trust and loyalty, as well as reducing the number of conflict situations and reworks, which creates preconditions for sustainable salon business development and for positioning the service as premium not only in visual terms but also in its health-promoting component. Taken together, this makes it possible to consider advanced dry manicure a promising vector in the evolution of nail services, integrating dermatological validity, standardized hygiene, and controlled aesthetic outcomes into a single, reproducible, and economically significant practice model that warrants further scientific investigation and scaling.

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