

Predictive model for better health conditions in nail salons worldwide

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SUMMARY

Looking attractive with well-maintained nails has been considered a desirable trait in our society. At times, this care was done at home or in parlours with natural nail paints. Then came the idea of synthetic products, which enhanced the beauty of the nails. Attractive nails soon became associated with successful and confident individuals and were perceived as a direct reflection of someone's personality. Brittle nails or chipped nail paints soon became a thing of the past. However, the effect of nail care has not yet been examined. Personal beauty does not just mean external care, but the need to maintain our healthy body and mind is a must.

Through our study, we not only direct the interest of readers towards the hazardous effects of nail salons but also predict a small solution which, if adopted right now, will be beneficial to both customers and the nail salon industry.

INTRODUCTION

Scientists and historians around the world have emphasised the importance of physical appearance variation in developing personal and social relationships (Korichi et al., 2008). Many studies have revealed that physically attractive individuals are more competent, successful, and socially adept than less attractive individuals (e.g., Berscheid and Walster, 1974; Goldman and Lewis, 1977).

Nail art and Nail beauty are one of the major parts of physical appearance. The commercial cosmetic industry is among the most prevalent groups that have used ways to enhance the perceived attractiveness of women's nails. In modern society, women maintaining their nails is considered a daily ritual. Many cosmetics in the market artificially modify the appearance of nails, enabling women to conform to feminine beauty standards. The nail cosmetics industry continues to expand to meet growing consumer demand. Continuous changes in fashion trends and beauty awareness have fuelled the growth of the nail care market.

However, studies and observations around the world have a different story to share. In Toronto, researchers established that nail salons have a ton of different things that could affect someone's health (e.g. chemicals, dust, sitting in a particular way for too long). So these researchers decided they wanted to find out what nail techs can do to stay safe from those factors. Then they gave nail techs a survey asking about age, gender, what they do at work and what precautions they are currently taking to stay safe. From this, they found that most nail techs are women, almost everyone did manicures and pedicures, and used gloves and masks. They also found that people had pain in their necks and backs, and some people had skin and breathing problems.

Interestingly, they found that people who worked with shellac polish were more likely to have a runny nose. This shows that even though nail techs may be using safety gear, they can still face health issues and we need to educate them about the different hazards they're probably facing. Studies have shown the existence of about 29 chemicals that are found in nail salons and are related to causing damage to the reproductive and endocrine systems directly.

Another study talks about the potential health risks that come with nail care products (zooming in on the chemical ingredients used in nail polishes and their consequences on people's health). They argue that we need to be more aware of these risks and take steps to make nail care safer. It talks about how nail care is super popular and many people want to do it, but people (who work in nail salons or are consumers) don't know about the chemicals that may be harming them. It talks about a "toxic trio" which consists of toluene, DBP and formaldehyde. All three of these are known to be harmful. It also discusses TphP (a chemical that is harmful to hormones). The problem is that many women (who are at a sort of childbearing age) are at an even higher risk because they work in nail salons or themselves use nail care products. The research author suggests that we could use safer ingredients in nail care products instead, and even though some products will be labelled "3-free" (implying that they won't have the three "toxic trio" chemicals), they can still have disruptive chemicals. This article also talks about the environmental impact and how education is needed for both workers and consumers. It talks about how chemicals can spread through the air or water, or soil, and that's not good. There's a super detailed diagram too that's basically like a food chain but for how chemicals travel from one place for example, and land up affecting everything like everything. Personally, it scared me a bit and is making me question the need to do my nails as often as I currently do.

Another detailed study in Michigan showed that some of the common VOCs are ethyl acetate, propyl acetate, butyl acetate, MMA, n-heptane, and toluene. These were only detected in nail salons around. MMA has many restrictions around it, but it is found in most salons, sometimes at very high concentrations. This study wanted to know where these compounds are and how good or bad the ventilation is in salons. So what the researchers did is go to 17 salons and collect air samples to measure the VOC concentrations (in the general area and the personal breathing zones of people receiving nail services). And then they checked the VOC composition of 35 nail products and checked ventilation (like the rate of it) by using carbon dioxide concentrations. What they found is that MMA (restricted in the USA since sometime in 1970) was found in 15 out of 17 salons. And they also found the other VOCs that I list out above. In the breathing of personal versus general, they found that personal exposure measurements (like the breathing zone) were generally higher than area measurements, suggesting that workers and clients are exposed to higher levels of VOCs than what is measured in general salon air. Since this study was during autumn and winter, they saw that many salons had low ventilation rates (this can lead to a higher concentration of VOC's) and they noticed that some salons did not meet recommended ventilation standards. The study highlights the potential health risks that come along with prolonged exposure to these chemicals (respiratory irritation, neurological symptoms and other

not good health effects). The researchers also underscore the need for better controls in nail salons (improved ventilation and restrictions on harmful chemicals) to protect the health of both workers and clients. There needs to be increased awareness and education about the risks associated with these chemicals.

METHODOLOGY

Survey

To conduct the survey, questions were designed keeping in mind the topic of research. Questions about conditions of nail salons, frequency of visits to these salons and after effects were a few topics on which we approached both Indian and foreign respondents. The Data was collected over a span of 3 months and was analysed thematically for patterns or any unique observations.

The survey questions were further constructed based on subjective experiences of nail salons, ethnographic-style notes taken during nail salon visits and existing literature about ventilation systems and harmful chemicals often present in nail salons.

The survey was administered among individuals from UK, U.S.A, China, India and Singapore, and included multiple respondents. The respondents, while predominantly female, represented an array of different ages, occupations, and socioeconomic positions. The survey form was circulated online using simple random sampling and built in des riptide statistical pie charts.

All ethical standards were met. Responses were anonymized to further ensure respondents' confidentiality.

Construction of the box

For construction of the model for the nail salons, basic cardboard was used with glue and scissors. Markings were made and the proportions were kept the same as expected for most real-world nail salons to ensure generalizability.

RESULTS AND DISCUSSION

Survey

We surveyed to examine the relationship between nail salons and the health of individuals associated with them directly or indirectly.

Our survey involved mostly the people who go to nail salons on a regular basis. This helped us understand the dynamics better and that a conclusive result could be obtained. The chart below shows the number of times our volunteers visited the nail salons.

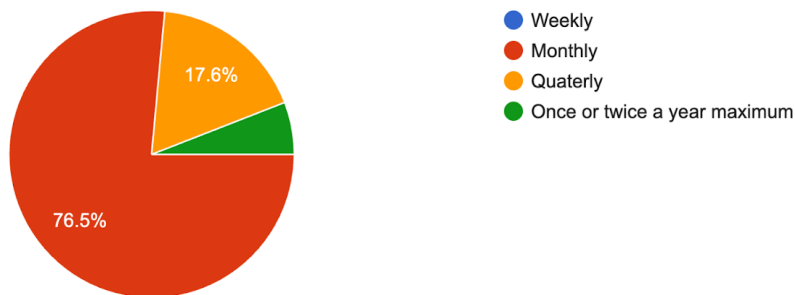


Figure 1- The Figure shows that 76.5% of the volunteers visited these salons on a monthly basis with some also doing it every quarter.

In reference to multiple reviews most of the individuals mentioned a peculiar smell that is associated with these salons. This peculiar smell could be associated with multiple particles which tend to stay in these salons permanently.

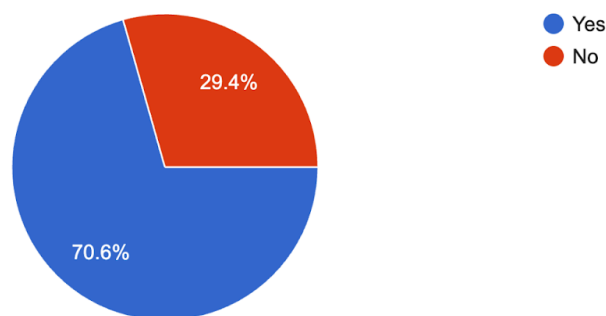


Figure 2 - Most of the volunteers mentioned a smell associated with the surroundings of the nail salon

Another major observation was about the ventilation system of the salons. No enquiry about this is done and no mention about the same is ever visible in the salons either.

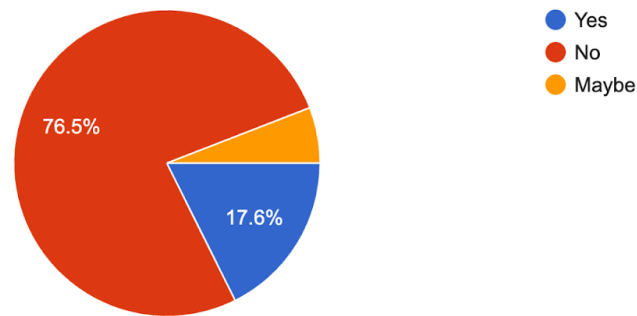


Figure 3- Most of them mentioned about no information about the ventilation system of the salon and nothing was being talked about it

Health of the individuals/ technicians is not looked into either in these salons. The survey showed that there was no enquiry about any regular check planned for these technicians either.

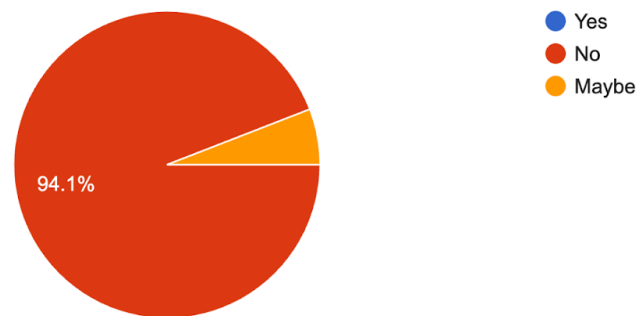


Figure 4- Showing that no information about technician health or upkeep is provided or visible in the salon.

Model for the Room

Keeping in mind the harmful effects of irritants and how their circulation and accumulation over time can lead to musculoskeletal problems and respiratory symptoms, we came up with a model that can be used as a benchmark to start in nail salons, which included:

- Presence of a HEPA filter or an Air curtain at the entry
- Two fans fitted in the walls for circulation (represented by circles). These fans ensure that no deposition of materials occurs.
- Two square windows on the opposite side of the salon allow clear ventilation.
- Fitted exhausts on each working table to help absorb the nail residue
- A working table to have fibre sheets fitted in front of the customer and the technician, with holes to move hands.

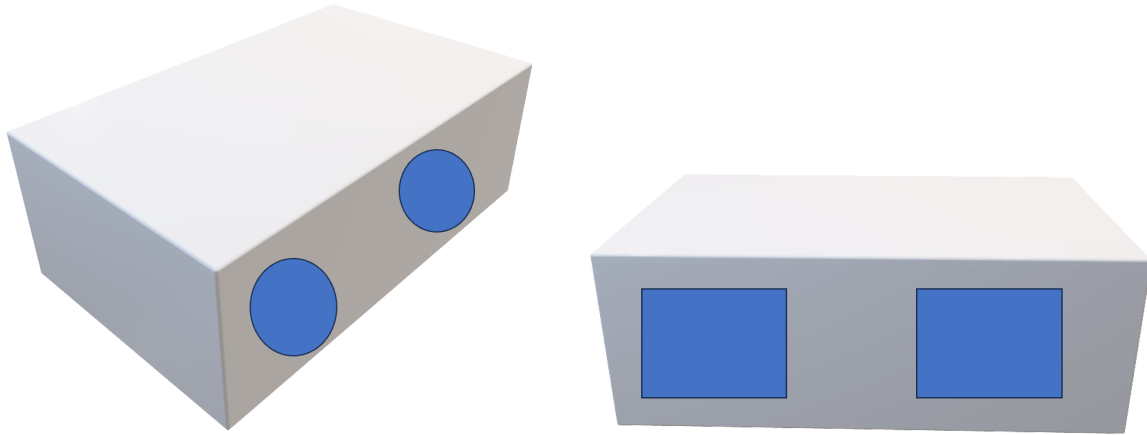


Figure 5-Arrangement of windows and fan area.

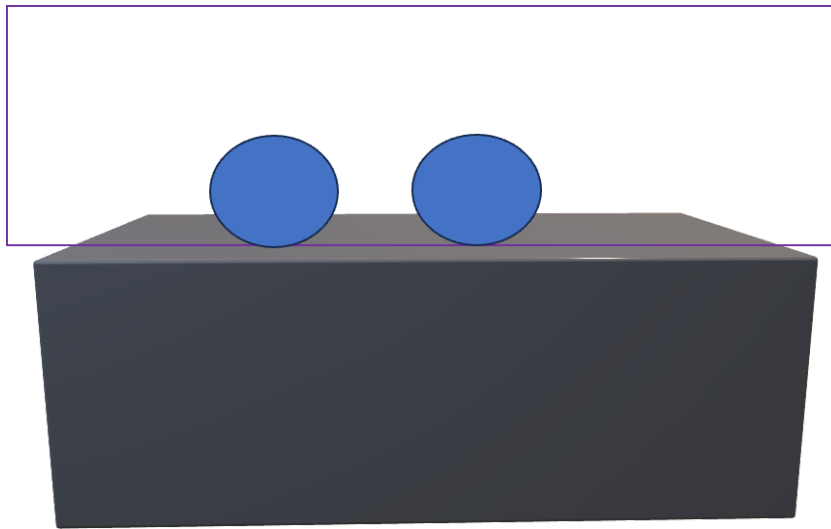


Figure 6- Arrangement of the work bench with a fibre glass for both sides and holes indicate the place to move the hands inside.

CONCLUSION

In conclusion, the survey conducted on nail salons reveals a concerning link between salon environments and various health problems experienced by both workers and clients. The data collected supports the idea that prolonged exposure to chemicals commonly used in nail treatments—such as formaldehyde, toluene, and acetone—can contribute to respiratory issues, skin irritation, headaches, and other health complications.

To address these challenges, the model we developed offers a practical and effective solution that benefits both clients and technicians. By integrating the mentioned changes, the model not only raises awareness of potential hazards but also promotes a healthier and safer salon environment.

While further testing and refinement may be necessary, the model demonstrates a promising approach to reducing health risks in nail salons. With broader adoption, it could lead to significant improvements in occupational safety and customer well-being in the beauty industry.

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