

Original Article

Carcinogenic Awareness of UV Nail Dryers

Akhila Poliseti

Lancers International School, Haryana, India.

Corresponding Author : akhilaram.12@gmail.com

Received: 15 August 2023

Revised: 23 September 2023

Accepted: 06 October 2023

Published: 20 October 2023

Abstract - In today's day and age, the usage of UV Nail Dryers is constantly increasing, and there have been multiple associations with Skin Cancer. Most previous research discusses "that the public appears to be confused about the carcinogenic potential of these nail lamps." The study aims to examine consumers' behaviors, patterns, and carcinogenic awareness of UV Nail Dryers. The rationale behind the study is that this lack of awareness can endanger several millions of lives. This study used a self-constructed questionnaire consisting of 26 questions circulated amongst a sample population of 30 women through convenience sampling regarding patterns practiced and awareness regarding UV nail dryers. Some significant findings are that 56.67% of consumers are often not aware of the threats associated with UV Nail Dryers, 46.67% of initial nail treatments occur below the age of 20, and 43.33% of the precautions pre and post-nail treatments are not taken. The future implications of this study are that the nail salons might have a decrease in their revenue. Dermatologists and sunscreen companies can benefit. Human scientists would explore reasons for the observed, and Cancer Researchers may explore methods and tools to confirm the relationship between skin cancer and UV Nail Dryers.

Keywords - Awareness, Carcinogenic, Skin Cancer, UV Nail Lamps, UV Rays.

1. Introduction

Having a 'glow up' is common amongst today's generation of teenagers and adolescents. These practices have been a significant outcome of 'that girl' trends. Having a 'glow up' usually involves getting manicures and having new hairdos. Although getting manicures regularly is believed to be a form of self-love, it ultimately leads to an individual's self-sabotage, as the ultraviolet dryers used

in fingernail manicuring can increase the risk of skin cancer[1]. In 2020, 20.05 million Americans performed manicures four or more times[2], and due to such influencing 'trends,' the frequency of visits to nail salons has increased extensively. Nail salons for the age group 19 to 40 years dominated the market with a share of over 46% in 2022[3].

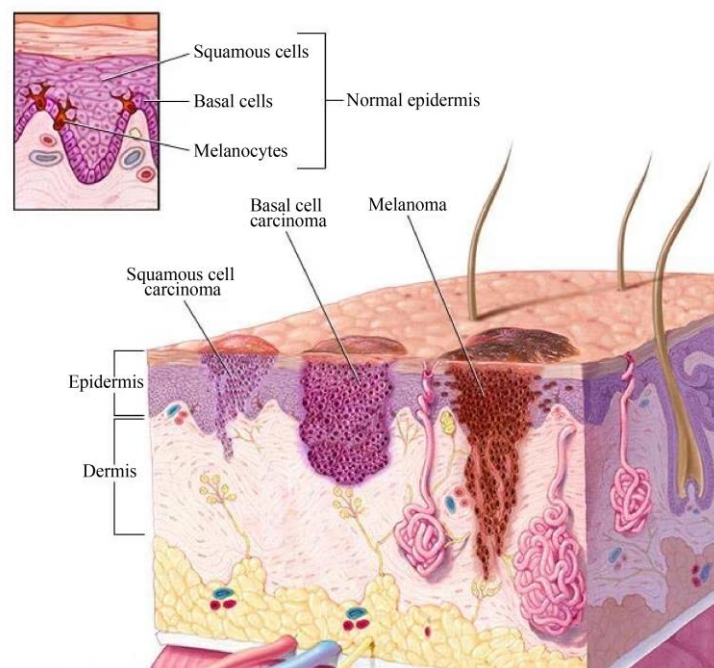


Fig. 1 ("Squamous cell carcinoma of the skin - Symptoms and causes")[10]



UV generates oxidative free radicals. UV photons interact with atomic oxygen to promote the formation of free radical derivatives such as superoxide, hydrogen peroxide, and the highly reactive hydroxyl radical. Free radicals avidly attack macromolecules such as protein, lipids, RNA, and DNA, altering their structure and interfering with their function [4], leading to mutations and rapid growth of cells, leading to skin cancer. UV radiation contains vitamin D. However, it can devastate the human body when exposed in large quantities[5]. In general, UV radiation is a part of the electromagnetic radiation from the sun[6]. It is divided into three categories: Short-wave UVC (100-280 nm), Medium-wave UVB (280-315 nm), and Long-wave UVA (315-400 nm)[7]. In saloons, UVB and UVA rays are often used to dry the gel polish quickly. Ultraviolet Light B (UVB) has a medium wavelength and reaches the top layer of the skin, whose excessive exposure leads to sunburns. In contrast, Ultraviolet Light A (UVA) has a longer wavelength and reaches the first two layers of skin. Overexposure leads to sunburns and wrinkles[8].

There are three main types of skin cancer: basal cell carcinoma, squamous cell carcinoma, and melanoma[9]. Basal Cell Carcinoma is a type of skin cancer caused due to excessive exposure to UV radiation from sunlight [10]. It is found when the basal cells—the outermost layer of the epidermis, produce new skin cells—have mutations in the DNA. The damage to the DNA is caused due to long-term exposure to UV radiation[10]. Squamous Cell Carcinoma develops in the squamous cells, which are the middle and outer layers of the skin[11]. It is caused when the flat cells' DNA undergoes mutations due to UV radiation, which causes the cells to grow out of control and continue living when normal cells would die[12], leading to skin cancer. This type of skin cancer is not fatal but is considered 'aggressive.' Lastly, Melanoma is the most dangerous type of skin cancer. It is developed in the melanocytes, which give the skin its color by producing melanin[13]. It is caused when the skin's life cycle is disrupted: The new cells push the older cells to the outermost layers, where they eventually fall off. However, DNA mutations make the new cells grow rapidly, leading to skin cancer[14]. UV radiation plays a key role in these three types of skin cancer. However, most studies prove that UV rays are not the sole factor behind one's skin cancer. Nevertheless, reducing exposure to UV radiation and applying sunscreen is a standard precaution for skin cancer in general.

Furthermore, a 20-minute session can lead to 20% or 30% damage to the cells, and Three or more consecutive 20-minute sessions lead to 65% to 70% of cell death[15]. Some types of nail services that involve UV nail dryers are:

- Gel Manicure: This lasts 45 minutes and involves 10-15 minutes under the nail dryer.
- Acrylic Overlays: This lasts up to 1 hour and 30 minutes and involves at least 30 minutes under the nail dryer.

- French Manicure: This lasts 45 minutes to 1 hour and involves 20-25 minutes under the nail dryer.

The prevalent research gap is very minimal research on this issue and little to no awareness regarding the potential consequences of frequent nail treatments. Plus, consumers are often confused about whether or not there is a potential link amongst UV Nail Dryers and Skin Cancer. The problem is that precautions such as sunscreen are available; however, only very few are aware of and actively taking these measures. In addition, most nail salons hide this fact from their clientele again, leading to a significant problem. From an extensive literature review, it is observed that "The knowledge of respondents about UV radiation was poor. The rate of correct responses was 54.7%." [16] and "The topic is a developing one and will require more research attention." [17], thus, the question of awareness amongst consumers has not been studied yet, and this paper aims to delve deeper into the awareness and patterns of consumers, a research area that has not been explored previously. Through mixed-method research, this study aspires to solve this problem by researching the common patterns and behaviors of consumers when they are getting their nails done and delving deeper into the carcinogenic awareness of the consumers.

2. Methodology

2.1. Research Aim

The present research paper aims to understand people's awareness and behavior of the consequences of nail treatments. A survey research design is used in the current paper. Survey research is a quantitative method used for data collection from a particular set of populations.

2.2. Sample

A total of thirty women were surveyed belonging to the age group of 14 - 37 belonging to upper socio-economic backgrounds living in India and the USA (25:5). Convenience sampling was carried out in the study. The inclusion criteria include respondents who have gotten nail extensions done at least once in their life.

2.3. Tools Used

A self-constructed questionnaire was circulated with the sample group. The survey included closed-ended questions to understand their nail treatment behavior and awareness of the possibilities of different skin diseases due to nail extensions. Some of the questions included in the survey are:-

- Do you apply sunscreen on your fingers prior to the manicure?
- Do you think it can potentially lead to skin cancer?
- Do you believe that skin cancer through UV radiation from nail dryers won't occur commonly?
- How long has it been since you've started getting your nails done?
- How often do you get your nails professionally done in a year?

2.3.1. Informed Consent

Informed consent was taken from all the respondents. Confidentiality was maintained; no information will be shared with the third party.

2.3.2. Data Collection Procedure

For the data collection, a Google form was circulated via different social media channels.

3. Results and Discussion

Through the research study results, some significant findings and inferences could be made and observed regarding consumers’ behaviors and patterns as well as their awareness of skin cancer.

About 85% to 90% of women worldwide use nail care products[18]. The prevalent behavior associated with professional manicures is that it is considered a “self-care” activity with a low frequency per year. According to

Figure 2, it can be observed that 90% (27) tend to get their nails done professionally 1-3 times a year. Today, It is often rare to discover individuals who prefer to get their nails done professionally six or more times per year, as it is a maximum of 3.3% (1) in the data collected. Nevertheless, global nail care products are expected to expand at a compound annual growth rate (CAGR) of 5.2% from 2022 to 2030[19]. Thus, expecting a rise in the frequency of professional nail care visits per year, Figure 2 is projected to increase.

Specifically, in these “visits” to the nail salon, the most popular treatment is the simple manicure without the polish, as according to Figure 3, it accounts for 60% (18) of the common nail treatments consumed. However, the remaining (12) 40% chose treatments that require the assistance of UV nail lamps that cure and dry nail polish formulas, known as gels, which are oligomers requiring exposure to UV radiation to harden into polymers[20].

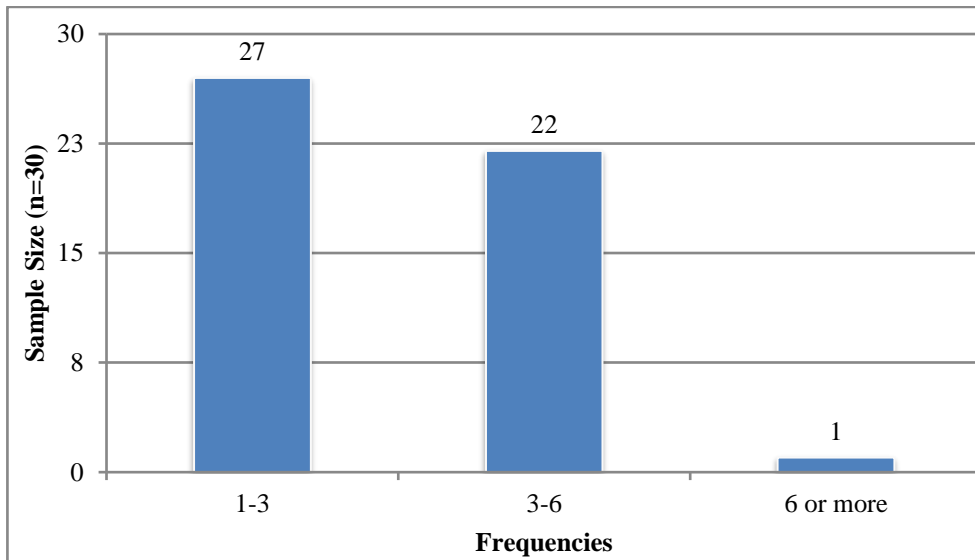


Fig. 2 Graphical representation of frequency of professional nail care visits per year (N= 30)

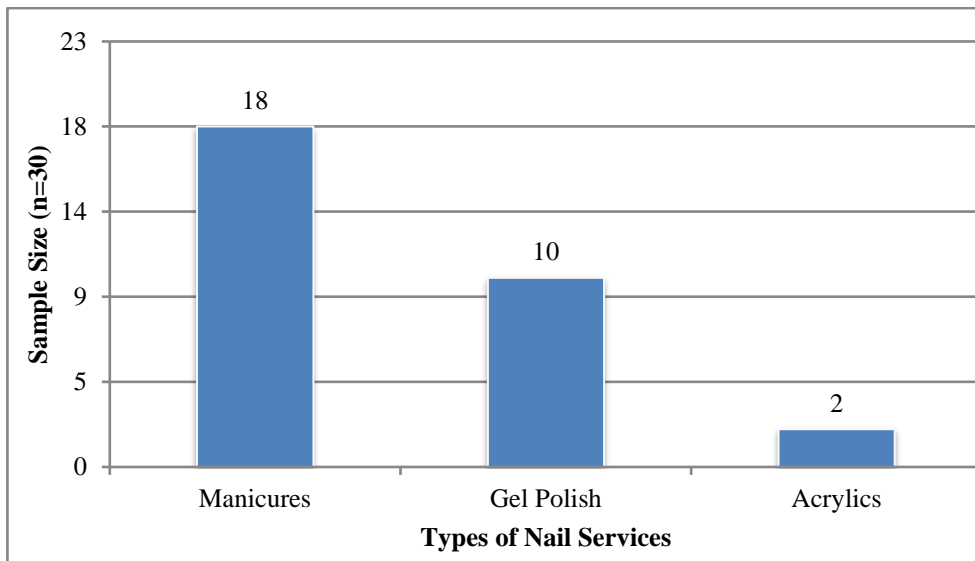


Fig. 3 Graphical representation of the frequency of varieties of nail services received (N=30)

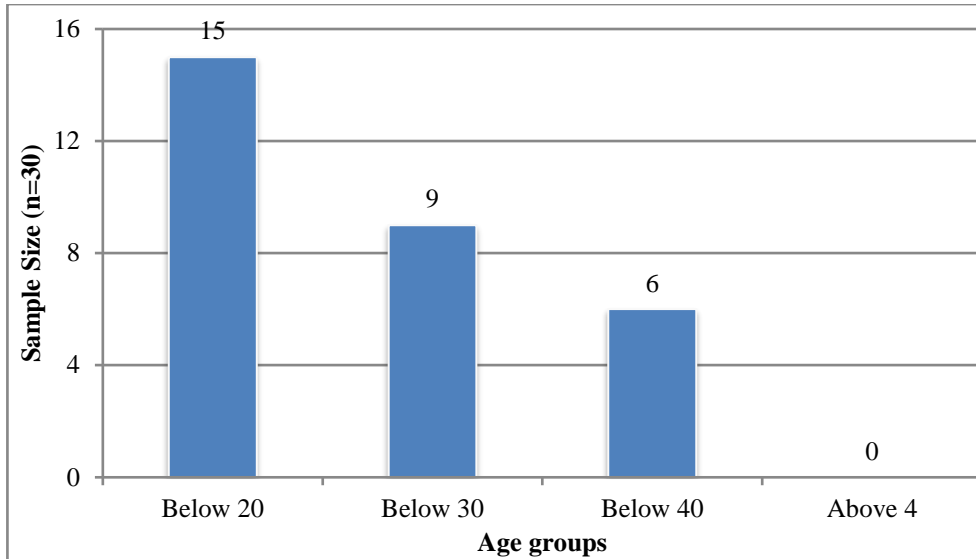


Fig. 4 Graphical representation of initial occurrence of professional nail treatment (N=30)

These have become extremely popular in the last decade as UV gel polishes were introduced in 2012 and revolutionized the industry. The polish was dry when the clients left the salon, and while the service took slightly longer than the traditional manicure, it lasted two to three weeks[21]. Due to the drastic increase in demand for UV Nail Dryers, they are widely available across the globe, thus increasing the chances of exposing a broader and younger audience to the harmful UV rays emitted.

According to Figure 4, Almost 50% (15) have had their initial nail treatment occurrences below the age of 20. After one session under the UV light, 20–30% of the cells exposed died, which increased to 65–70% after three consecutive sessions[22]. Thus, exposing younger, more tender skin to UV rays can lead to significantly more damage than more mature skin, like above 40. In Figure 4, only 20% (6) have gotten their initial nail treatments at or above the age of 40.

Due to YouTubers, Instagram Influencers, and TikTokers establishing and practicing these trends post-COVID, 40% (12) have done their nails professionally under a year ago, according to Figure 5. On the contrary, up to 30% (9) have gotten their nails done four or more years ago, according to Figure 5. The drastic distinction between the time span is primarily because the popularity of nail dryers has risen recently, thus making this service accessible widely across all cities and states not more than one or two years ago.

Thus, the residents of large cosmopolitan cities are more likely to get their nails done four or more years ago. In contrast, the residents of towns and small cities are getting it done only recently due to its increased accessibility nowadays. Due to the use of the convenience sampling method for this research study, the geographical location and the age group have variety and diversity. That, thus, may have been the reason for such results in Figure 5.

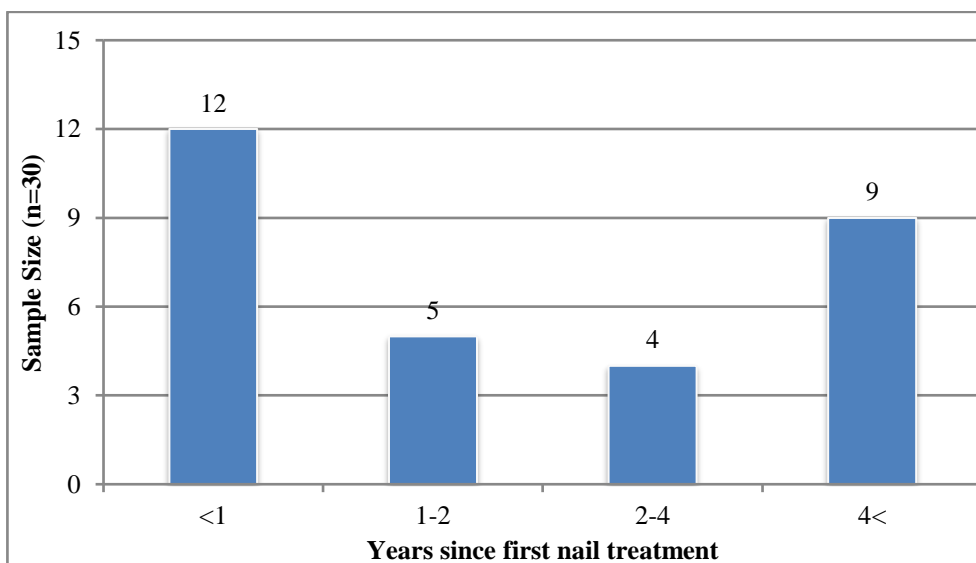


Fig. 5 Graphical representation of duration since first professional nail care (N=30)

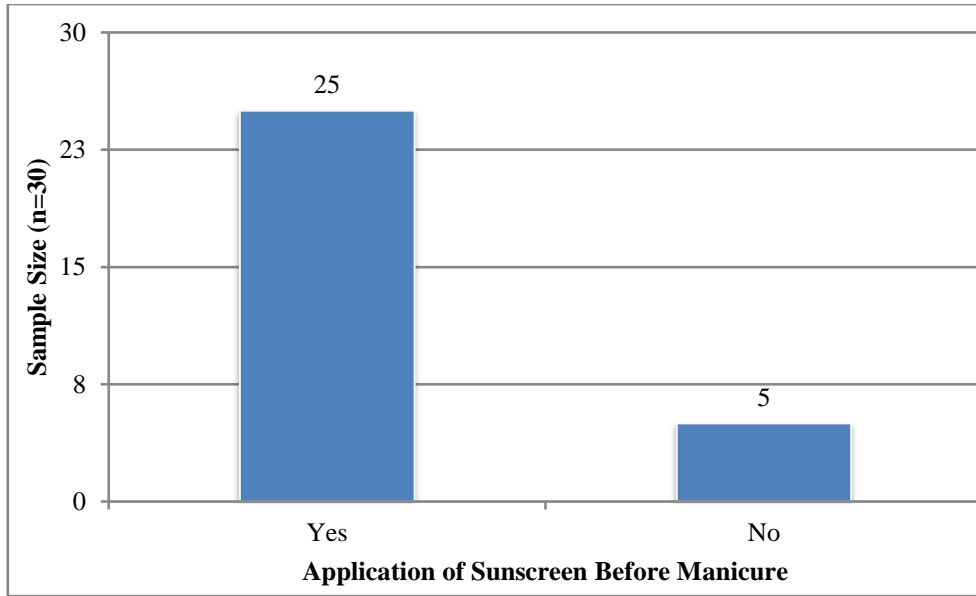


Fig. 6 Graphical representation of application of sunscreen before manicure (N=30)

In 1982, UV lamps were first used in nail services with the introduction of hard gels by James Giuliano[23]. After a mere forty years, UV Nail Lamps have become widely accessible and consumed goods worldwide. Although they are world-renowned and consumed extensively, the awareness and knowledge about the carcinogenic consequences of UV rays emitted from lamps are significantly lacking. Although efforts to instruct people to wear sunscreen are present, such as the American Academy of Dermatology Association spreading awareness to “apply a broad-spectrum, water-resistant sunscreen with an SPF of 30 or higher to your hands to prevent skin cancer and premature skin aging[24]”, a majority of their efforts are going into vain. Individuals are barely practicing precautionary measures to prevent or reduce the damage caused by nail dryers. The reason

being, In Figure 6, we can notice that 83.33% (25) do not apply sunscreen before their nail treatments, and only 16.67% (5) tend to.

It can also be noticed from Figure 7 that 43.33% (13) tend to take absolutely no precautions prior to or even after their manicures, and only 16.67% (5) use sunscreen. An unexpected result observed was that 6.67% (2) applied oil, 6.67% (2) also applied moisturizer, and 10% (3) either wiped or washed their hands before or after their manicure. This shows that some precautionary measures are taken; However, only by a lesser number of respondents. The most evident reason behind this is the lack of awareness regarding the potential consequences of professional nail treatments.

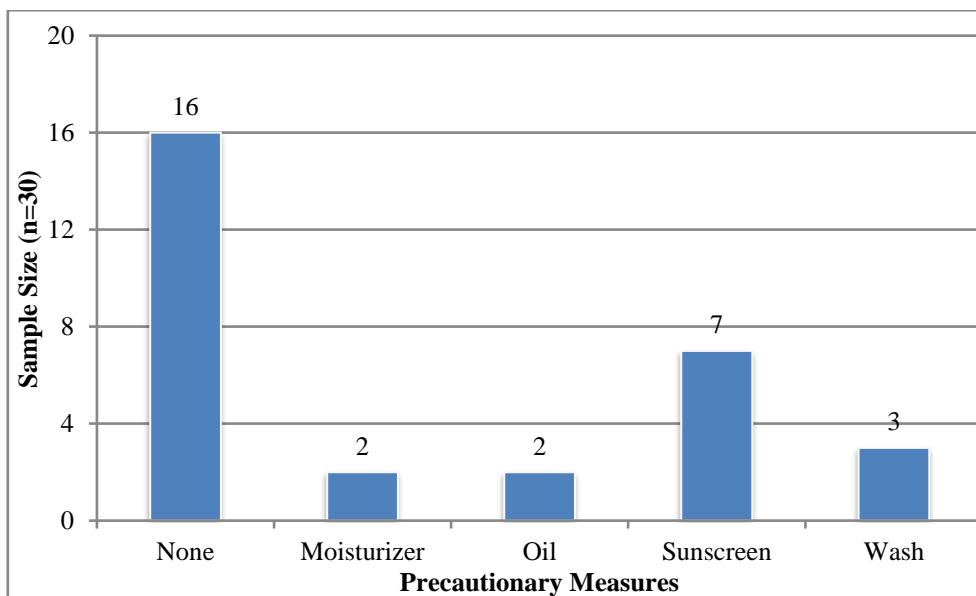


Fig. 7 Graphical representation of Precautions Prior/Post Nail Treatment (N=30)

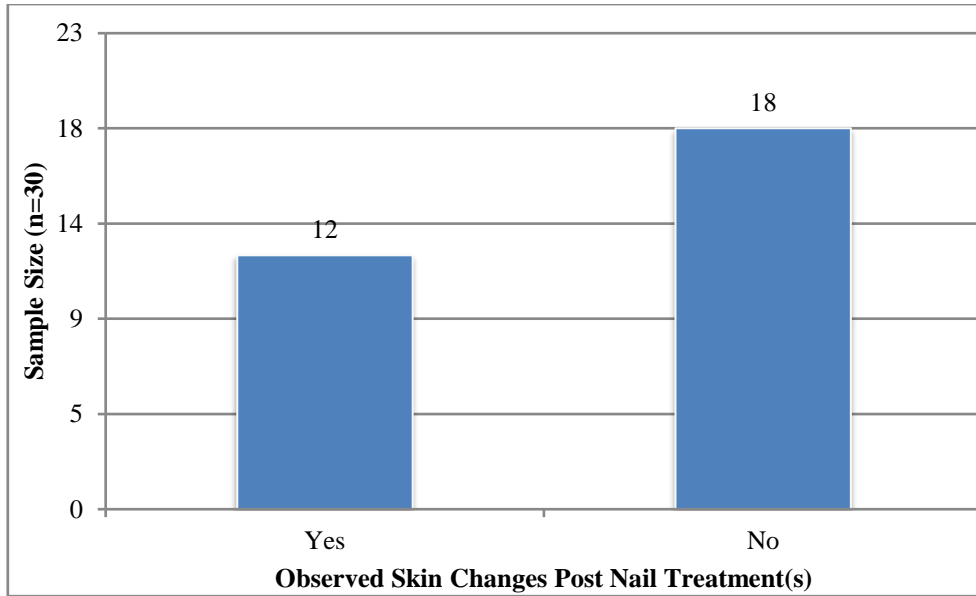


Fig. 8 Graphical representation of observed skin changes post nail treatment(s) (N=30)

Another possible reason is that the changes post manicures are not observed; even if they were, they are presumed to be 'normal.' From Figure 8, can understand that 60% (18) do not observe any changes in their skin, and only 40% (12) are able to notice those changes in their skin. Thus, because they fail to notice any changes, they do not take any precautions as, according to them, nothing is wrong.

However, it dries the skin out and dehydrates it, particularly your cuticles. Nail polish can also cause skin irritation and itchiness for some people, and in the worst case, it can cause an allergic reaction if it comes into contact with your skin[25]. As cuticle drying is not often noticeable, individuals believe their skin is okay when it is not.

Moreover, The most surprising result obtained during the research study was learning from Figure 9 that 70% (21) of the sample group “do not encourage using nail dryers.” and 30% (9) believe it would “help them dry their nails quickly.” Thus, it can be inferred that the nail service customers are unaware of the potential threat this ‘fast-drying’ puts them at.

The reason is, According to Figure 10, 23.33% (7) stated they “don’t know” the impact of UV nail dryers. However, 33.33% (10) believe it leads to damage, and 23.33% (7) know it is cancer-causing. Thus, the understanding that UV Nail Dryers are potentially carcinogenic is present; however, the complete understanding is lacking.

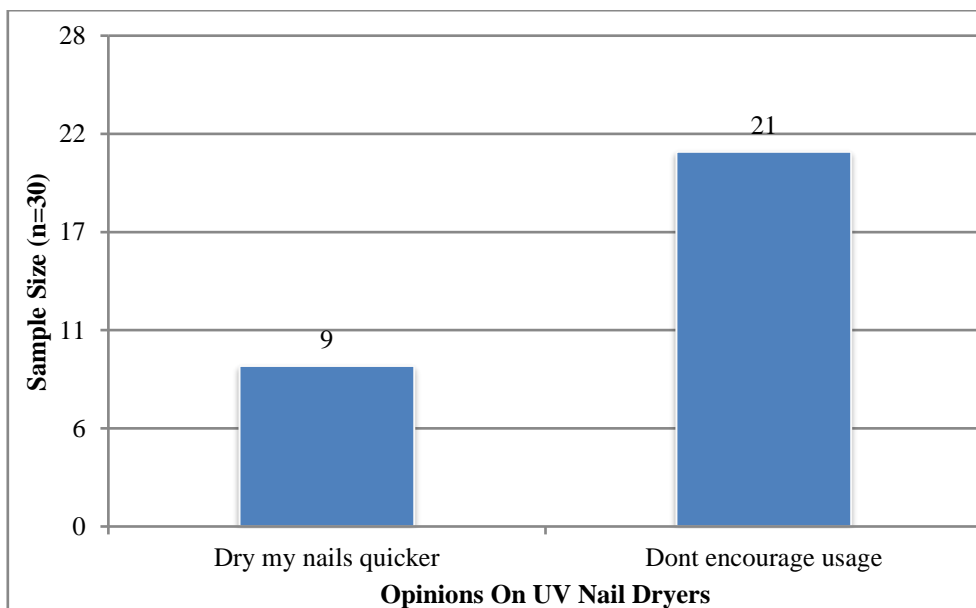


Fig. 9 Graphical representation of Opinions of UV Nail Dryers (N=30)

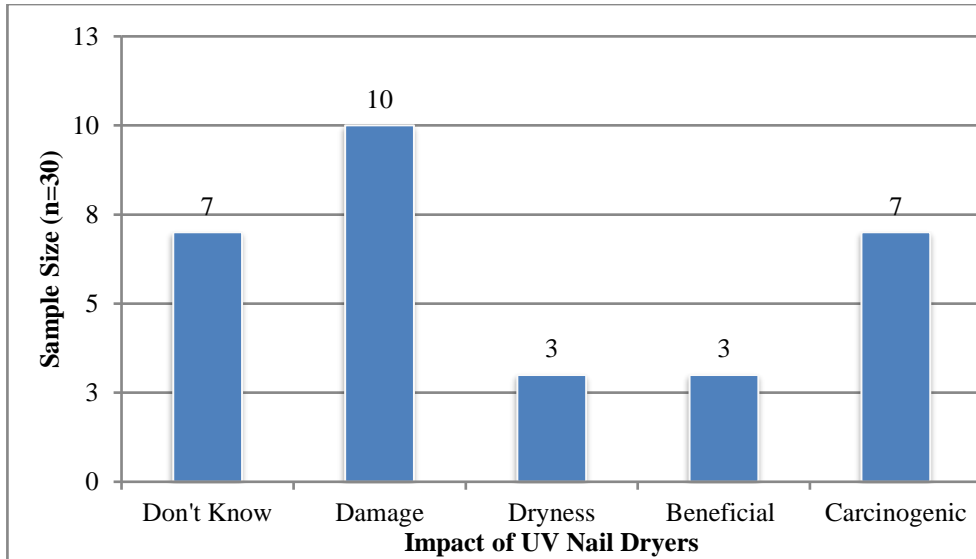


Fig. 10 Graphical representation of the Impact of UV Nail Dryers (N=30)

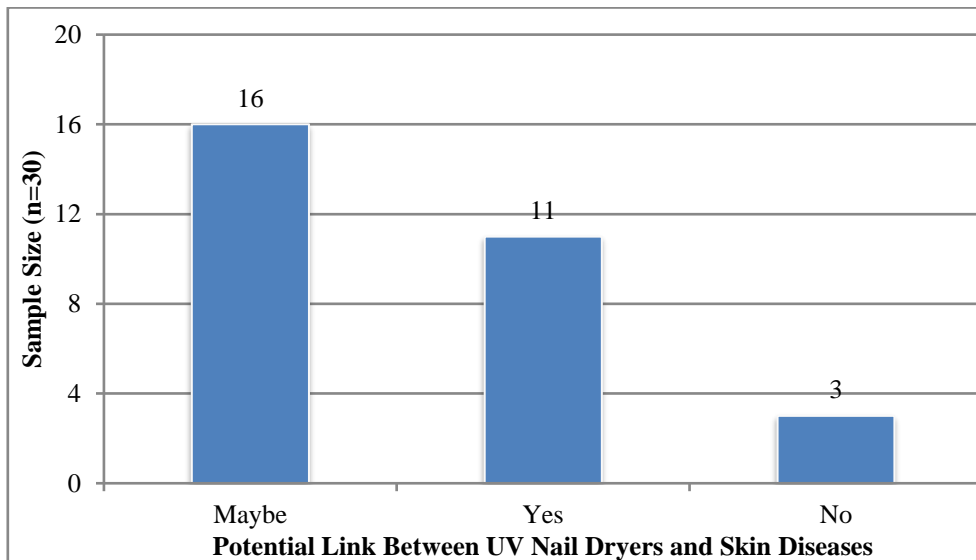


Fig. 11 Graphical representation of the potential link between UV Nail Dryers and Skin Diseases (N=30)

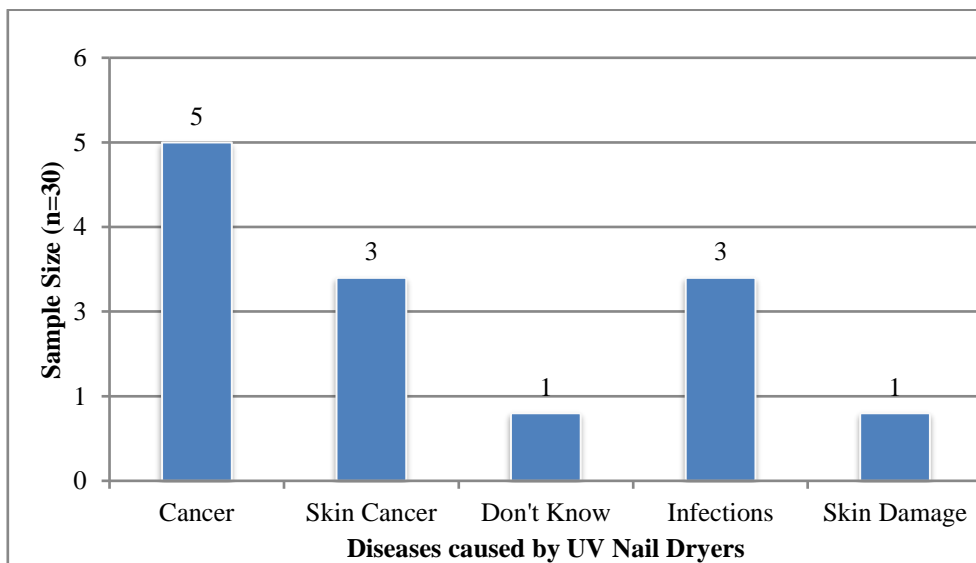


Fig. 12 Graphical representation of diseases caused by UV Nail Dryers(N=13)

Another piece of evidence supporting this inference is that in Figure 11, 53.33% (16) believe there is “Maybe” a potential link between UV Nail dryers and Skin diseases. In contrast, only 36.66% (11) know the potential link between UV Nail Dryers and Skin diseases.

A recent study called “Can UV gel nail polish dryers cause skin cancer?” says that frequent UV nail dryers can damage DNA and cause cell death in human hands, potentially increasing the risk of skin cancer due to chronic and repeated UV exposure[27]. Due to such studies, consumers are now slightly aware of UV Nail Dryers’ possible threats and consequences. Can observe this in the research study, summarised in Figure 12, as 38% (5 out of

13) predicted cancer is a disease that UV Nail dryers can cause, and 23% (3 out of 13) predicted skin cancer.

In addition, In Figure 13, 56.67% (17) believe UV Nail Dryers are “maybe” associated with Skin Cancer Risk, and 43.33% (13) are certain that UV Nail Dryers are strongly associated with Skin Cancer Risk.

In Figure 14, 80% (24) believe that there “maybe” a likelihood of skin cancer from UV radiation from Nail Dryers. Therefore, the general public lacks awareness due to the minimal research on this association. However, due to research studies and papers like the one mentioned above, consumers are slowly becoming more aware.

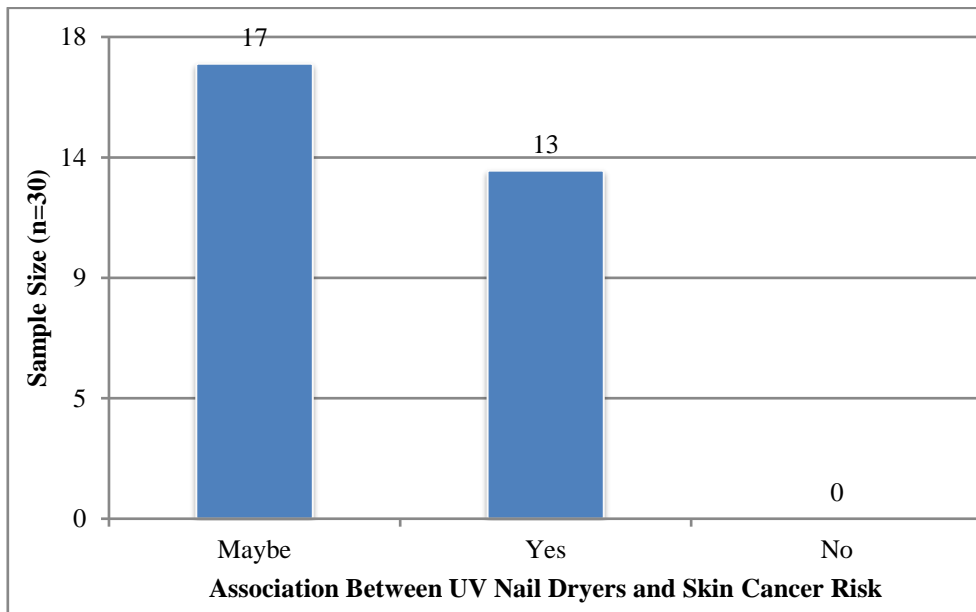


Fig. 13 Graphical representation of the association between UV nail dryers and skin cancer risk (N=30)

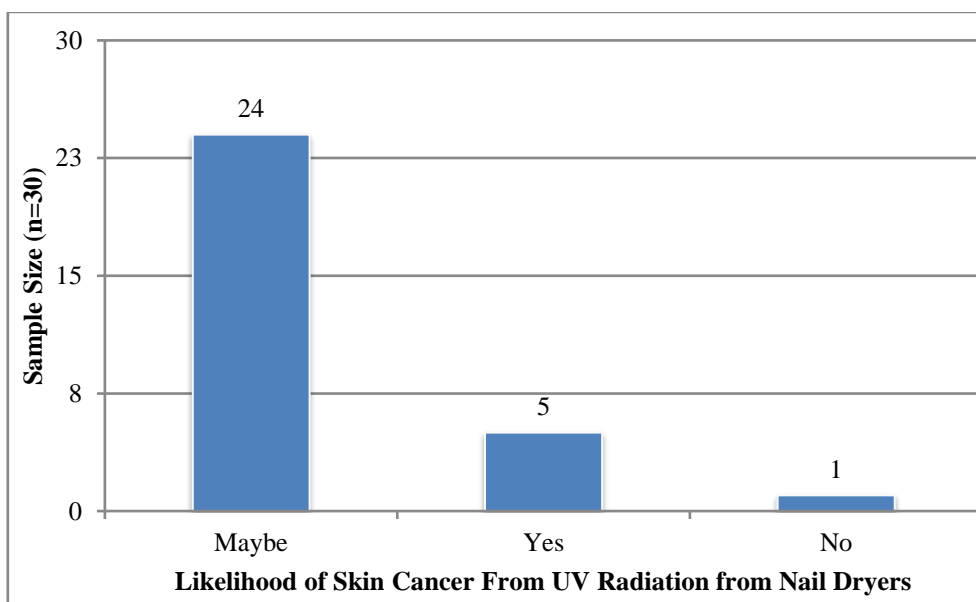


Fig. 14 Graphical representation of the likelihood of skin cancer from UV nail dryers(N=30)

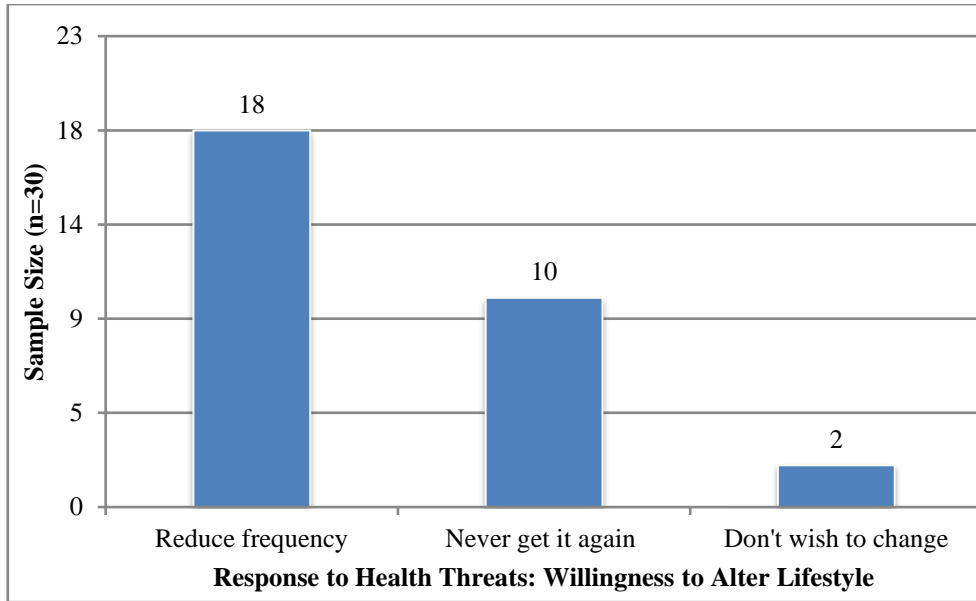


Fig. 15 Graphical representation of response to health threats: willingness to alter lifestyle (N=30)

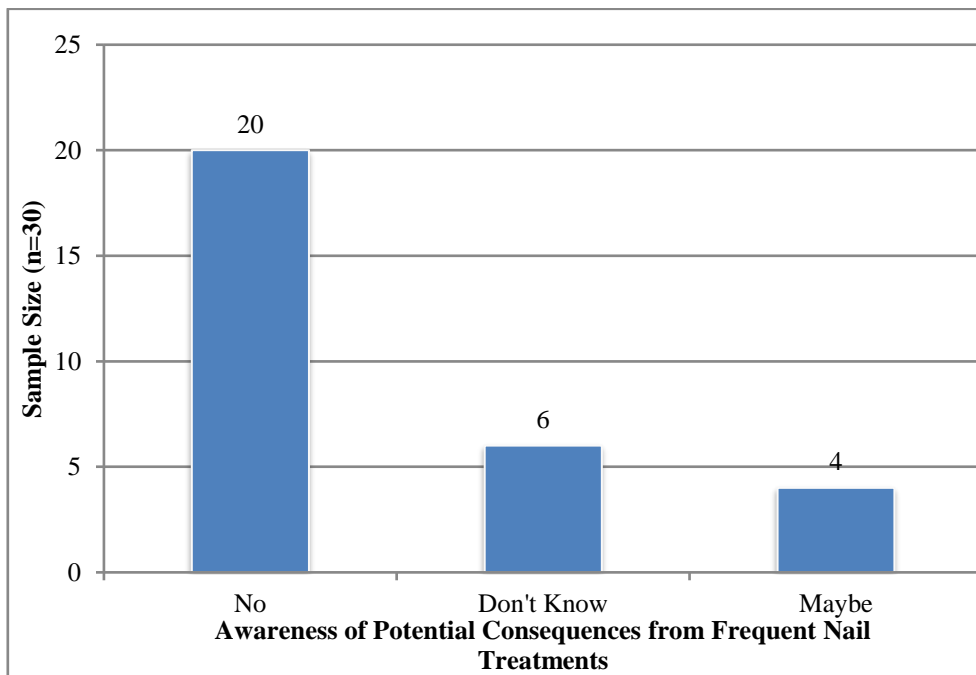


Fig. 16 Graphical representation of awareness of potential consequences from frequent nail treatments (N=30)

Through this research study, it is inferable that it's not just the awareness that is required to make the change in the consumer's attitude when, in reality, it's actually their actions that play a key role in protecting themselves from the carcinogenic threats associated with the UV Nail Lamps. In Figure 15, can observe how 60% (18) mentioned that they would "reduce the frequency of their visits." and 33.33% (10) mentioned that they would never get their nails done in the salon again. Although 6.67% (2) still do "not wish to cut this out of their lifestyle." it's the change in attitude amongst the consumers to take action regarding their health that matters.

Furthermore, in Figure 16, it's very evident that 66.67% (20) state that many are not aware of the potential consequences of Nail Treatments, and only a mere 13.33% (4) believe that many "maybe" aware of the associated consequences. This suggests that consumers lack the carcinogenic awareness of nail treatments. Many nail companies and research studies suggest that UV gel manicures have a very minimal risk due to short exposure time, which is why there's so much misinformation amongst consumers, prevents spreading awareness and makes individuals uncertain regarding whether or not there's a potential threat due to UV Nail Dryers.

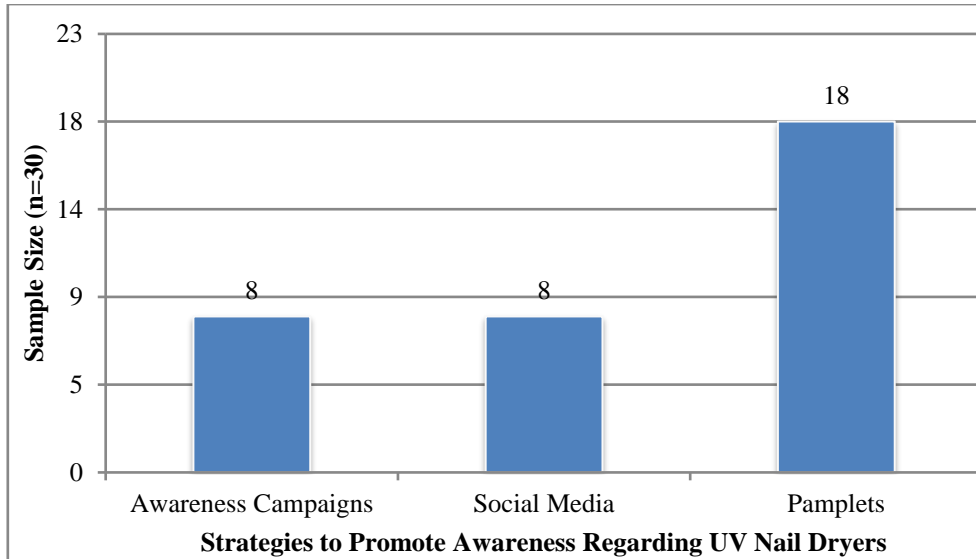


Fig. 17 Graphical representation of strategies to promote awareness regarding UV nail dryers (N=30)

Lastly, Filling the information and knowledge gap among the consumers of these nail services is essential. Thus, through Figure 17, It can be inferred that physical pamphlets and posters are the first steps to spreading awareness within the communities, as 46.67% (14) suggested that it’s an effective strategy to promote awareness. For instance, placing these posters and pamphlets in nail salons is critical to educate consumers about potential threats.

In addition, 26.67% (8) suggested Social Media and another 26.67% (8) suggested Awareness Campaigns as an effective tool to spread awareness because the general perception of “nail curing lamps as low risk” is the reason for extensive misinformation among the consumers and through these strategies suggested from the research study and forming policies, It can effectively spread awareness and reduce the skin cancer risk.

The reason why this study was able to achieve better results compared to the other studies awareness research studies mentioned above is that this study’s range of respondents from various age groups and from different countries allows the conclusion to be generalized globally.

4. Conclusion

UV Nail Dryers are increasingly drawing consumers’ attention across all age groups worldwide. Evidence from previous research suggests that further and more advanced research is necessary for thoroughly evaluating the link between UV Nail Dryers and Skin Cancer. However, their usage rate is rising exponentially, and awareness regarding the threats and associated risks is significantly lacking among consumers. This study conducted primary research to assess individuals’ behaviors and awareness regarding UV Nail Dryers. More importantly, it highlights the respondent’s lack of knowledge and awareness regarding the harmful and potentially life-threatening UV rays and

sheds light on the respondent’s behavior while getting their nails done professionally.

There are some limitations to this study, though. For example, this study’s respondents have diverse age groups, occupations, and geographical locations, thus making the responses range and may restrict them from being empirically meaningful. Another limitation of the study is that some respondents are doctors or MBBS graduates; thus, they are more aware of the carcinogenic consequences of UV Nail Dryers.

This study is the first step, and many more in the future will be carried out to continue this research further. These include delving deeper into the carcinogenic awareness of the UV nail dryers for specific locations such as Delhi NCR. To study how the behaviors and patterns while getting nail treatments differ with age groups. To study how carcinogenic awareness has increased or decreased for different age groups.

This study consists of individual’s genuine patterns and behaviors with UV Nail Dryers, and due to its varied age groups and diverse geographical locations and occupations, the study’s results are generalized for a large age group and in different geographical locations such as urbanized Delhi NCR, suburban Nandyal and specific states of the US. Through the results of this study, the nail salons would prepare for the decrease in their revenue and switch the UV Nail Lamps to LED Lamps to create safer nail services. Dermatologists can benefit due to increased treatments, and the field of dermatology would also boom due to the increasing cases demanding more dermatologists to treat the patients.

Sunscreen companies are more aware of their product’s potential benefits and plan marketing campaigns to increase sales. Human scientists now have foundational research about human behavior associated with UV Nail

Dryers and can conduct further research on the specific and accurate reasons for behaviors and patterns. In addition, Cancer Researchers and Scientists are more aware of the cruciality of their research. They are incentivized to continue their research in this field and delve deeper into the methods and tools to confirm the potential link between skin cancer and UV Nail Dryers. Finally, the government and policymakers are more aware and have tangible research to create awareness programs and camps and establish policies.

Acknowledgement

I sincerely thank my mother, Dr. Midde Madhavi Latha, for sharing that UV Nail Dryers are associated with Skin Cancer and for supporting my research on this topic. I would sincerely like to thank Ms. Srishti Kapoor and Ms. Sugandha Jain for being my research mentors and guiding me each step of the way while writing my research paper. I thank all my respondents to the survey for contributing to this research study.

References

- [1] The AI Research Assistant, Elicit.org, 2023. [Online]. Available: <https://old.elicit.org/>
- [2] US Population: Frequency of Manicures within 6 Months from 2011 to 2020, Statista Research Department, 2022. [Online]. Available: <https://www.statista.com/statistics/287031/frequency-of-manicures-in-the-us-trend/>
- [3] “Nail Salon Market Size, Share and Trends Analysis Report By Service (Manicure, Pedicure), By End-user (Men, Women), By Age Group (Below 18, 19 to 40), By Region (Asia Pacific, North America), and Segment Forecasts, 2023 - 2030,” *Grand View Research*, pp. 1-83, 2023. [Publisher Link]
- [4] Timothy L Scott, UV Generates Oxidative free Radicals, UV Photons interact with Atomic, Researchgate.net, 2023. [Online]. Available: https://www.researchgate.net/figure/UV-generates-oxidative-free-radicals-UV-photons-interact-with-atomic-oxygen-to-promote_fig5_237095045
- [5] UV and Vitamin D, SunSmart, 2023. [Online]. Available: <https://www.sunsmart.com.au/uv-radiation/uv-and-vitamin-d#:~:text=Spending%20longer%20in%20the%20sun,naturally%20overdose%20on%20vitamin%20D.>
- [6] Ultraviolet (UV) Radiation, Center for Science Education, 2023. [Online]. Available: <https://scied.ucar.edu/learning-zone/atmosphere/ultraviolet-uv-radiation>
- [7] Radiation: Ultraviolet (UV) Radiation, World Health Organization, 2016. [Online]. Available: [https://www.who.int/news-room/questions-and-answers/item/radiation-ultraviolet-\(uv\)](https://www.who.int/news-room/questions-and-answers/item/radiation-ultraviolet-(uv))
- [8] What is the Difference between UVA and UVB Rays?, University of Iowa Hospitals and Clinics, 2018. [Online]. Available: <https://uihc.org/health-topics/what-difference-between-uva-and-uvb-rays>
- [9] Skin Cancer - Symptoms and Causes, Mayo Clinic, 2020. [Online]. Available: <https://www.mayoclinic.org/diseases-conditions/skin-cancer/symptoms-causes/syc-20377605>
- [10] Basal Cell Carcinoma - Symptoms and Causes, Mayo Clinic, 2021. [Online]. Available: <https://www.mayoclinic.org/diseases-conditions/basal-cell-carcinoma/symptoms-causes/syc-20354187>
- [11] Squamous Cell Carcinoma, the Skin Cancer Foundation, 2019. [Online]. Available: <https://www.skincancer.org/skin-cancer-information/squamous-cell-carcinoma/>
- [12] Squamous Cell Carcinoma of the Skin - Symptoms and Causes, Mayo Clinic, 2023. [Online]. Available: <https://www.mayoclinic.org/diseases-conditions/squamous-cell-carcinoma/symptoms-causes/syc-20352480>
- [13] Skin Cancer (Melanoma), Mayo Clinic Health System, 2023. [Online]. Available: <https://www.mayoclinichealthsystem.org/locations/la-crosse/services-and-treatments/oncology/common-cancers/skin-cancer>
- [14] Melanoma - Symptoms and Causes, Mayo Clinic, 2022. [Online]. Available: <https://www.mayoclinic.org/diseases-conditions/melanoma/symptoms-causes/syc-20374884>
- [15] Carrie Nagorka, Study Finds Cancer Risk Associated with UV Nail Dryers *Dermatology Times*, *Dermatologytimes*, 2023. [Online]. Available: <https://www.dermatologytimes.com/view/study-finds-cancer-risk-associated-with-uv-nail-dryers>
- [16] Jolanta Malinowska-Borowska, and Marta Buczkowska, “Knowledge about Ultraviolet Radiation (UVR) and Attitudes and Behaviour Regarding Gel Manicure According to the Age of Women,” *Journal of Education, Health and Sport*, vol. 24, no. 1, pp. 44-52, 2023. [CrossRef] [Google Scholar] [Publisher Link]
- [17] Katarzyna Basta-Arciszewska et al., “Health Effects of UV Nail Lamps - Is There a Risk of Cancer?,” *Journal of Education, Health and Sport*, vol. 12, no. 9, pp. 891-904, 2023. [CrossRef] [Google Scholar] [Publisher Link]
- [18] Jessica K. Reinecke, and Molly A. Hinshaw, “Nail Health in Women,” *International Journal of Women’s Dermatology*, vol. 6, no. 2, pp. 73-79, 2020. [CrossRef] [Google Scholar] [Publisher Link]
- [19] “Nail Care Products Market Size, Share and Trends Analysis Report By Product (Nail Polish, Artificial Nail and Accessories), By End Use (Salon, Household), By Region, And Segment Forecasts, 2022 - 2030,” *Grand View Research*, pp. 1-80, 2022. [Publisher Link]
- [20] Maria Zhivagui et al., “DNA Damage and Somatic Mutations in Mammalian Cells after Irradiation with a Nail Polish Dryer,” *Nature Communications*, vol. 14, no. 276, pp. 1-14, 2023. [Google Scholar] [Publisher Link]
- [21] UV Gel Systems, NailKnowledge, 2020. [Online]. Available: <https://nailknowledge.org/nail-knowledge-base/uv-gel-systems>

- [22] Katie Brighton, Nail Manicure Dryers Cause Cell Death and DNA Damage, Technologynetworks, 2023. [Online]. Available: <https://www.technologynetworks.com/genomics/news/nail-manicure-dryers-cause-cell-death-and-dna-damage-370785#:~:text=After%201%20session%20under%20the>
- [23] The History of Nail Polish, Nailpro, 2022. [Online]. Available: <https://www.nailpro.com/news/industry-news/article/21977332/the-history-of-nail-polish>
- [24] Gel Manicures: Tips for Healthy Nails, American Academy of Dermatology Association, [Online]. Available: <https://www.aad.org/public/everyday-care/nail-care-secrets/basics/pedicures/gel-manicures>
- [25] Is Nail Polish Bad for Your Skin?, ORLY, 2023. [Online]. Available: <https://orlybeauty.com/blogs/news/is-nail-polish-bad-for-your-skin#:~:text=Nail%20polish%20also%20really%20dries>
- [26] Brotozor Deliverance, Edeawe Isaac Osahogie, and Brotozor Onoriode, “Awareness and Practice of Student Nurses on Breast Self-Examination: A Risk Assessment Tool for Breast Cancer,” *SSRG International Journal of Nursing and Health Science*, vol. 6, no. 1, pp. 66-69, 2020. [CrossRef] [Publisher Link]
- [27] Susan Massick, Can UV Gel Nail Polish Dryers Cause Skin Cancer?, Ohio State Health and Discovery, 2023. [Online]. Available: <https://health.osu.edu/health/skin-and-body/skin-cancer-risk-from-uv-nail-dryer>