Efficiency of single and double ply non woven mask against N95: a review analysis

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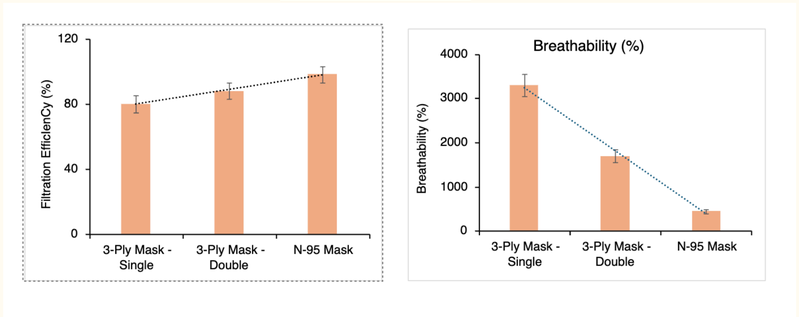
INTRODUCTION

Surgical masks should provide adequate filtration from harmful particles while allowing for optimal breathability and protection (Bagheri et al., 2021).

N95 surgical mask is considered the apex of standard for first line protection against contact and airborne diseases for healthcare workers. However, due to cost and peak periods such as during the pandemic, it is not always accessible (LaRue et al., 2021; Htwe et al., 2022) - leaving healthcare workers to find the safest alternative.

Therefore, the purpose of this review study is to proffer suitable alternatives that do not compromise safety.

RESULTS



The filtration efficiency of the 3-ply nonwoven masks increased with the number of layers. Single-ply 3-ply masks showed a filtration efficiency of approximately 60%, whereas double-ply masks showed 85%. N95 masks demonstrated the highest filtration efficiency at about 95%.

As for breathability, single-ply 3-ply masks exhibited the highest breathability at approximately 4,000%, followed by double-ply masks, which had a moderate decrease in breathability. N95 masks showed the lowest breathability, which aligns with their higher filtration efficiency.

These findings ultimately indicate that while double-ply nonwoven masks offer a good balance between filtration and breathability, single-ply masks may be suitable for low-risk environments, whereas N95 masks remain to be the best choice in high-risk settings.

METHODOLOGY

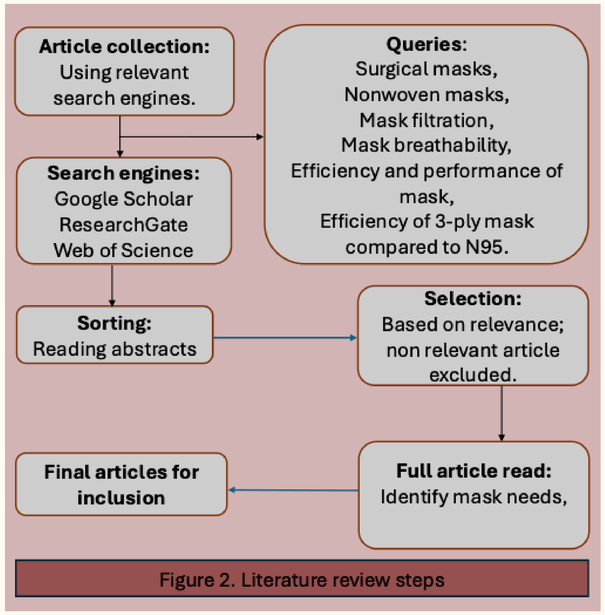


Figure 2. Literature review steps

This study employed a review of the literature to gain a better perspective on the effectiveness of 3-ply nonwoven masks used either as single or double ply in the absence of N95 surgical masks. This will possible provide a guide as to when 3-ply nonwoven masks can be used as a substitute for N95 masks.

DISCUSSION

This review highlights the trade-off between filtration efficiency and breathability in mask selection. N95 masks provide the highest protection (95% filtration) but have low breathability, making them ideal for high-risk settings. Double-ply 3-ply nonwoven masks (85% filtration) offer a balanced alternative with better breathability, while single-ply masks (60% filtration) are more comfortable but less protective. Given these findings, mask choice should be based on risk level rather than hierarchy in healthcare settings. Further research should explore ways to enhance both protection and comfort.

CONCLUSION

While N95 masks remain the best option, double-ply 3-ply nonwoven masks provide a viable alternative in moderate-risk situations. Single-ply masks are suitable only for low-risk environments. Understanding these differences can help ensure effective protection, especially when N95 masks are unavailable. Future studies should focus on improving mask design for both safety and wearability.

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