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Singh Thattha Beard Covering Technique and Quantitative Fit Testing of a Tight-Fitting Filtering Facepiece (FFP3)

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Purpose and Rationale:

The purpose of this study is to evaluate the effectiveness of the Singh Thattha beard covering technique when quantitatively fit testing a tight-fitting filtering face masks (N95 respirator) on male members of the Sikh religious group.

The rationale behind the study is to find a way for male members of the Sikh religious group to wear an N95 respirator allowing them to maintain an adequate level of respiratory protection from potential occupational hazards

Background:

During the recent COVID-19 pandemic, members of the Sikh religious community who were enrolled in medical, dental, nursing or an allied health school or who were already in the medical profession had to make a tough decision whether to shave their unshorn beard to continue with their schooling and profession or change their projected professional aspirations or profession. They were faced with the difficult task of ensuring that they were adequately protected from occupational airborne hazards while also adhering to religious and cultural expectations. The lack of available alternatives during the initial phase of the pandemic further necessitated the need to explore creative solutions.

Methodology:

Volunteers selected an N95 respirator made available by the study team. N95 respirators used were: 3M 8210 N95, NORTH 7130, Halyard Fluidshield 3, and Progear N95.

We used a quantitative (QNTF) fit test method for this study. The QNTF is the preferred fit test method when selecting a respirator. The fit test device (TSI Portacount ® Model 8048; Shoreview, MN) measures the number of particles both inside and outside the mask and calculates a fit factor. The fit factor is a ratio of the air concentration inside the mask and the air concentration outside the mask for each exercise.

The test subject performed a set of exercises outlined in OSHA's Respiratory Protection Standard (29 CFR 1910.134). The test subject performed the exercises while wearing an N95 of their selection and then completed the exercises a second time wearing a Singh Thattha Beard Cover. The Singh Thattha Beard cover were FEI CanDo exercise bands (yellow – x-light 3.0 lb./1.4 kg; Red – light 4.0 lb/1.8 kg; and Green – medium 5.0 lb/2.3 kg).

At the conclusion of the fit test, the portacount ® calculated the overall fit factor. An N95 filtering facepiece respirator must achieve an overall fit factor of 100 to be deemed acceptable to use.

This study was approved by the IRB: PRO-2022-394

Results:

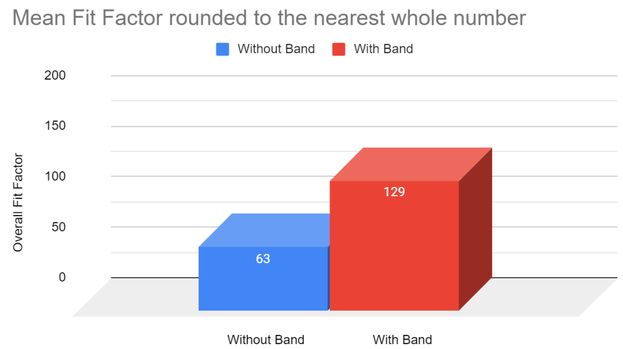

Figure 1: Bar chart comparing the mean fit factor without a band compared to with a band.

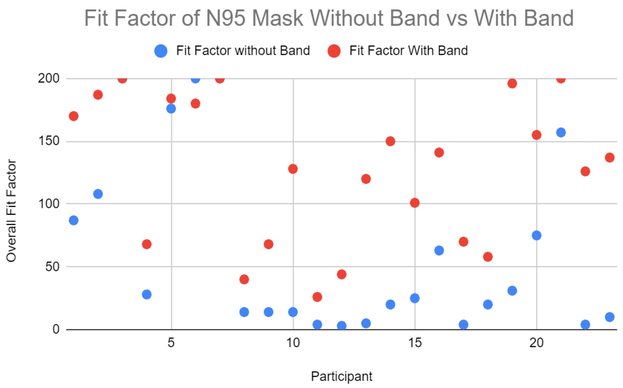

Figure 2: Scatter plot comparing fit factor of individuals before and after using a band. The blue points are unbanded while the red points are banded. The x-axis values are different individuals. The y-axis shows the limit of fit factor values that can be displayed by the Portacount.

Conclusion/Discussion:

Using bands to create a proper seal between the N95 mask has proven to be successful. Although an improvement in fit factor was observed in 96% of bearded men, the improvement was not always enough to achieve the minimum 100 fit factor to be acceptable for use. Further research and testing may be warranted to explore ways to achieve a higher or passing fit factor.

References:

1. Singh, R.; HS Safri; S.Singh; BS Ubhi; G. Singh; GS Alg; G. Rnadhawa; S. Gill Under-mask beard covering (Singh Thattha technique) for donning respirator masks in COVID-19 patient care; Journal of Hospital Infection106 (2020) 782-785 https://doi.org/10.1016/j.jhin.2020.09.034
2. Occupational Safety and Health Administration 1910 Subpart I Personal Protective Equipment 1910.134 Respiratory Protection (1910.134(f)(3) and 1910.134(g)(1)(i)(A) https://www.osha.gov/laws-regs/regulations/standardnumber/1910/1910.134