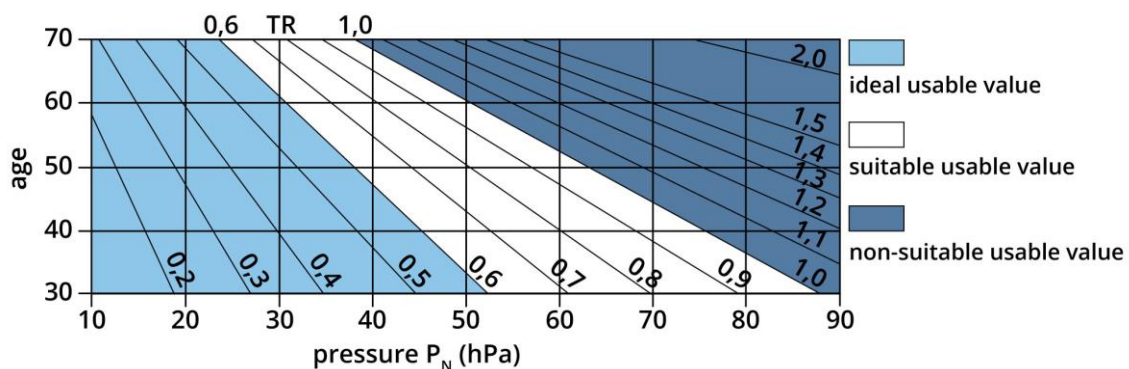


6 Spectacle frame pressure relation measurement

6.1 Introduction

Places where is contact between spectacle frame and skin are called “critical places”. Spectacle frame material negatively influences tissue metabolism. Secondary spectacle lens material is influenced by tissue emission substances. Main goal for the optometrist is to choose that combination of spectacle frame material and individual skin type which will be minimally destructive for each other. Empirical data show that accepted skin local stress should be 0.6 till 1 N/cm². The weight of the spectacle is divided into nasal part (90 % of total spectacle weight) and into spectacle side part (10 % of total spectacle weight). Picture 6.1 shows ideal values of pressure relation (PR) and of pressure (P_N) according to Fischbach (Rutrlle, 2001).



Picture 6.1.: Ideal pressure relation values according to Fischbach (inspired by Rutrlle, 2001).

6.2 Goals

- Calculate pressure relation for selected spectacle frame used for 60 years old patient
- Calculate pressure relation for selected spectacle frame used for your age

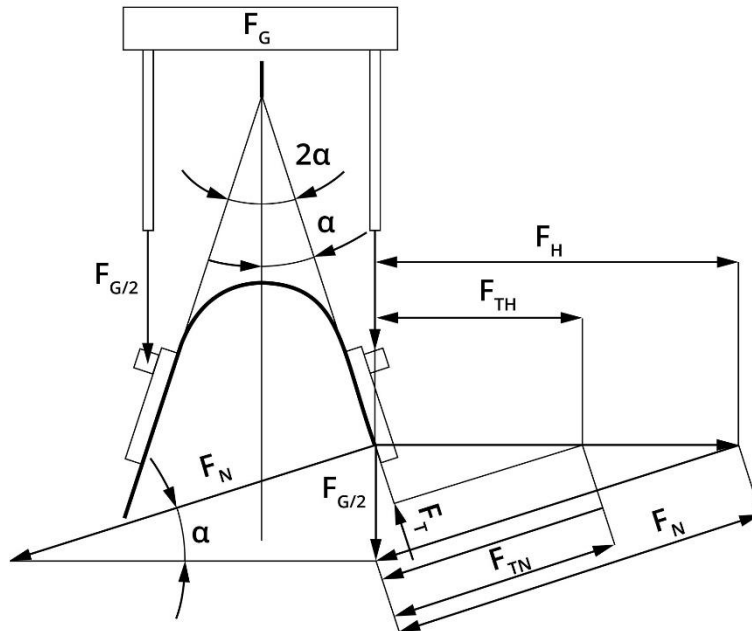
6.3 Equipment

Spectacle frame, digital kitchen scale, writing equipment, angle meter.

6.4 Methods

Calculate pressure relation for selected spectacle frame used for 60 years old patient

For pressure relation calculation we have to measure and calculate some other spectacle parameters. Firstly, measure angle α (see picture 6.2) which is important for calculation of power F_N (see formula 20). With this power press nasal spectacle pads in nasal area. In case of spectacle frame without spectacle lenses add weight 30 grams to weight of spectacle frame.

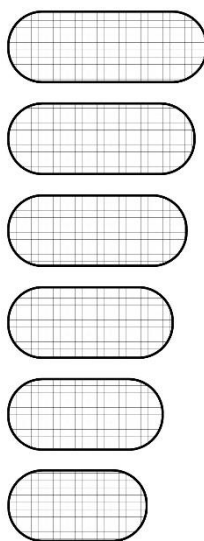


Picture 6.2: List of powers in nasal area (F_G – gravity power, α – angle between line of pad and vertical level, F_H – horizontal power, F_N – normal power, F_{TH} – horizontal friction power, F_T – friction power, F_{TN} – normal friction power; inspired by Rutrle, 2001).

$$F_N = \frac{m \cdot g}{2 \cdot \sin \alpha} \quad m \text{ [g]}, \alpha \text{ [}^\circ\text{]}, g \text{ [m.s}^{-2}\text{]}, F_N \text{ [cN]} \quad (20)$$

Note: We use spectacle weight in grams, g means adapted gravity constant 0.981 m.s^{-2} and resulted power F_N is calculated in cN.

After that we can calculate normal pressure P_N . For this calculation we need to know size of spectacle pad area. For this measurement we can use millimeter paper (see picture 6.3)



Picture 6.3: Fischbach's spectacle frame pad patterns (inspired by Rutrle, 2001).

Further we can according bellow listed formula (21) calculate normal pressure P_N . If we use 0.981 for value g and cm^2 for spectacle pad area, we will get result in hectopascals (hPa).

$$P_N = \frac{F_N}{S} \quad P_N \text{ [hPa]}, S \text{ [cm}^2\text{]} \quad (21)$$

If we have normal pressure P_N value, we can calculate pressure relation (PR). PR means ration between normal pressure and maximal pressure as a function of the age.

$$TR = \frac{P_N}{1,25*(100-age)} \quad P_N \text{ [hPa]}, \text{ age [years]} \quad (22)$$

Calculate pressure relation for selected spectacle frame used for your age

We can use the same calculation for PR as in example above.

6.5 Results

Calculate pressure relation for selected spectacle frame used for 60 years old patient

$PR_{60} =$

Draw shape of the nasal part of the frame and mark the angle alfa and its size.

Calculate pressure relation for selected spectacle frame used for your age

$PR =$

6.6 Discussion

If we get PR lower than 0.6 it means that spectacles can be worn without restriction. If the PR is lower than 1.0 spectacles can be used in case that patient's skin is healthy. Spectacle sides should be perfectly adapted. If the PR is higher than 1.0 spectacles should be used only for restricted time.

6.7 Conclusion, notes, comments

Which parameters of the spectacle frame should be adapted/changed for better PR?