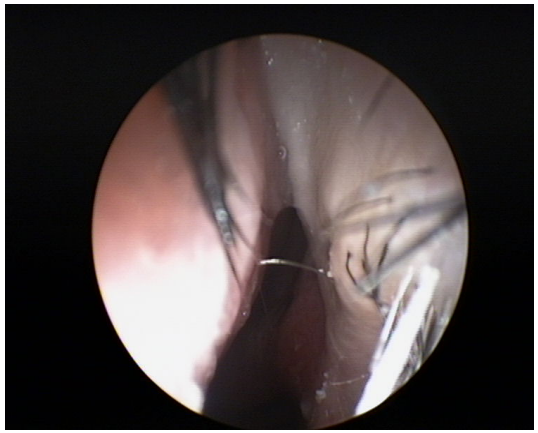
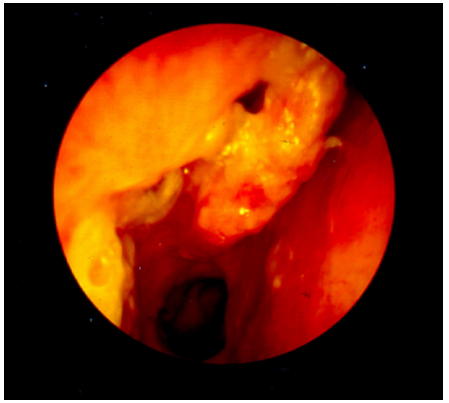
Peak nasal Inspiratory Flow: Normative value for Asian Ethnic

Introduction

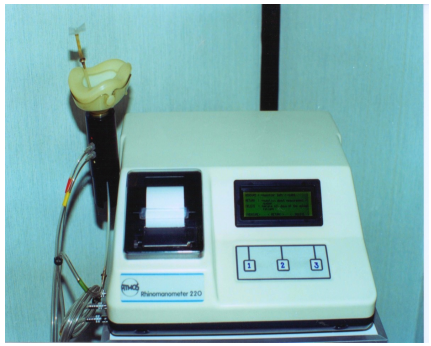
Nasal obstruction : one of the most common complaints/symptoms

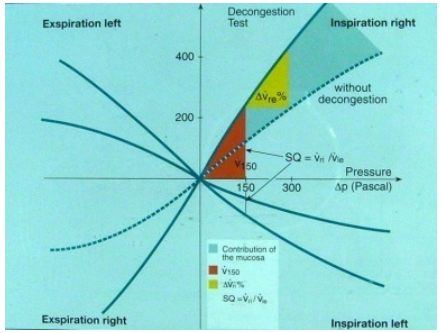




Introduction

- Quantitative evaluation of nasal obstruction : Rhinomanometer (RMM) and Acoustic Rhinometer (ARM)
- The rhinomanometer is *relatively expensive*, complex to use and *time-consuming,* especially if we test children because of the degree of patient coorperation
- Require *experience technician*





Introduction

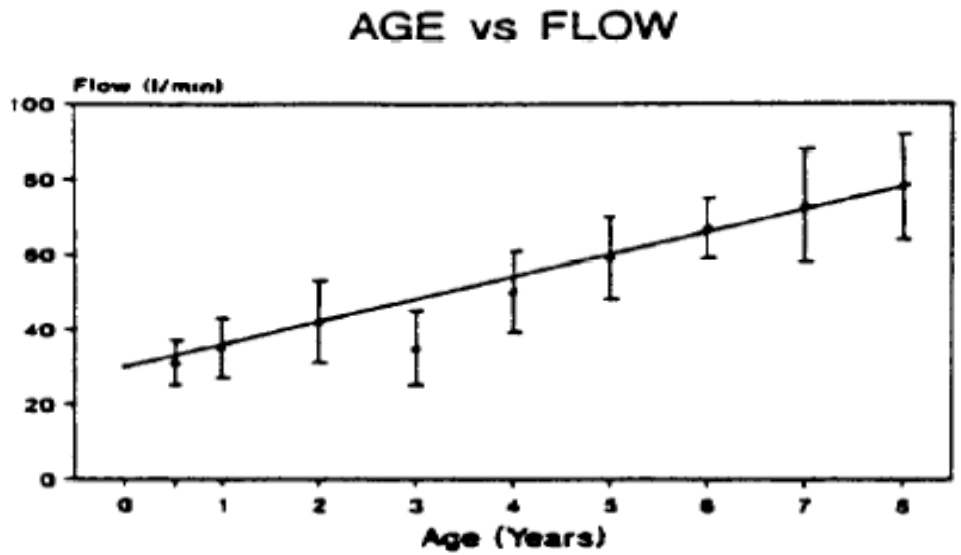
- In 1980, Youlten presented the **peak nasal inspiratory flow meter (PNIF)**, which is modification of *Wright peak flow meter* and consists of a face mask which the patient applies over the nose (without touching it) with the mouth closed
- The **patient sniff air through the nose** and the peak flow is recorded by a cursor

In-Check Nasal inspiratory flow meter

To reset the In-Check Nasal

Introduction

- *Prescott CAJ and Prescott KE* in 1995 studied the values for PNIF in normal **children**



C.A.J. Prescott, K.E. Prescott / Int. J. Pediatr. Otorhinolaryngol. 32 (1995) 137–141

Introduction

- *Giancarlo Ottaviano* was studied at the Royal National Throat Nose and Ear Hospital, London, UK, to establish baseline **normal values in adult subjects**

Table 1. Mean PNIF values at each attempt in males and females.

	Males (n=60)		*Female (n=77)*	
Variable	*Mean*	*SD*	*Mean*	*SD*
Age	43.3	22.1	40.2	18.6
Height	172.6	7.4	161.5	8.7
PNIF1	126.3	46.5	104.5	35.2
PNIF2	142	46.8	119.5	36.6
PNIF3	143	48.6	121.9	36

Nasal Airway Resistance in Asymptomatic Thai Population

Chaweewan Bunnag, M.D.*
Perapun Jareoncharsri, M.D.*

Siriraj Hosp Gaz
Vol. 47, No. 8, August 1995

NAR	Before decongestant	After decongestant
Rt. side	0.45 ± 0.21	0.33 ± 0.14 Pa/cc/sec
Lt. side	0.51 ± 0.31	0.34 ± 0.26 Pa/cc/sec
Total	**0.22 ± 0.10**	0.15 ± 0.06 Pa/cc/sec

taprat3/arn-rhino/arn-rhino/arn060608/arn3229-08a | diesiera | S=17 | 9/5/08 | 12:59 | Art: AJR06-08 | Input-lp

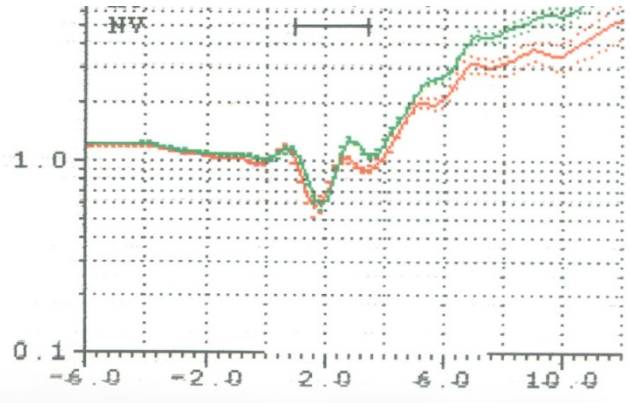
Acoustic rhinometry of Asian noses

Pongsakorn Tantilipikorn, M.D., Perapun Jareoncharsri, M.D., Siripom Voraprayoon, M.Sc., Chaweewan Bunnag, M.D., Peter A. Clement, M.D. Ph.D.

Table 3 Acoustic rhinometry of 135 healthy Thai adults: Comparison between male and female subjects

	Before Decongestion		After Decongestion	
	Male Subjects ($n = 38$)	Female Subjects ($n = 97$)	Male Subjects ($n = 38$)	Female Subjects ($n = 97$)
MCA (cm^2)	0.56 ± 0.15	0.55 ± 0.13	0.69 ± 0.17** (23.2% increase)	0.62 ± 0.12** (12.7% increase)
Distance (cm)	1.99 ± 0.67*	1.53 ± 0.51*	1.66 ± 0.88****	1.31 ± 0.65****
NV (cm^3)	3.78 ± 0.72	3.61 ± 0.65	4.50 ± 0.84*** (19.1% increase)	4.06 ± 0.68*** (12.5% increase)

*Distance, *$p = 0.000$; *MCA*; **$p = 0.026$; *NV*, ***$p = 0.002$; ****$p = 0.012$.*
MCA = minimal cross-sectional area; NV = nasal volume.



Objective

- Purpose of this study is to establish **normative PNIF** data for a healthy **Thai adults** population and imply those value as a reference for Asian Ethnic
- Assess correlation of **PNIF** normal values with **age**, **height**, **weight** and **sex** in adults
- **Comparison** of PNIF with the established quantitative tests of nasal obstruction by using Rhinomanometry (RMM) as the reference tests

Study design

- **Descriptive study**
- Study population : **180 healthy** Thai volunteers

$$n = [z\alpha/2 \, SD / d]^2$$

α = chance of type I error = 0.05 (2-sided), z0.025 = 1.96

SD = standard deviation of maximum PNIF in normal pop. = 50

D = Error of the estimation of mean of PNIF = 8 - 10

$$n = [1.96(50)/8]2 = 150$$

Giancarlo Ottaviano

Inclusion Criteria

- Age>15 years and Age <70 years
- No symptom of nasal congestion
- No history of asthma, rhinitis
- No structural abnormalities of nasal cavities

Exclusion Criteria

- Previous surgery to the nose and paranasal sinuses
- Take inhale nasal corticosteroid within 2 weeks or oral corticosteroid within 1 week
- Take nasal decongestant within 1 day
- Smoking

Material and methods

- A Portable Youlten flow meter (Clement Clark International) was used for the measure of peak inspiratory nasal flow
- The masks attached to the spirometer were chosen to fit tightly on each subject's face without touching the nose and were cleaned with swabs saturated with alcohol and dried between every subject tested

Material and methods

- All subjects were tested while sitting and were encouraged to inhale as hard and fast as they could through the mask keeping the mouth closed starting from the end of a full expiration
- *Three satisfactory maximal inspirations* were obtained and the highest of the three results was taken as the PNIF
- After PNIF was tested, 3%Ephidrine solution was sprayed in both nasal cavites and wait for 5 minuites then repeated again and wait for 5 minuites
- After 3%Ephidrine solution ingestion , All subjects were also tested with a Portable Youlten flow meter with the same techniques

Research Study Design Strategy

PNIF x3

3%ephidrine

2puff repeat 5min twice dose

PNIF x3

Results

Table 1 : Subjects demographic data. (N=180)

	Male(n=82)	Female(n=98)	Total(n=180)
Age (Yr)	39.18±14.04	38.74±13.53	38.94±13.73
Height (cm)	169.18±6.06	157.69±5.73	162.93±8.21
Weight (kg)	71.32±13.48	53.92±10.59	61.85±14.78
BMI	24.91±4.51	21.71±4.28	23.16±4.66

Results

Table 2: Peak nasal inspiratory flow rate (PNIF , L/sec) of male and female subject (N=180)

	Male(n=82)	Female(n=98)	p-value
PNIF1	119.33±33.13	82.96±23.99	
PNIF2	129.45±36.12	85.38±27.81	
PNIF3	132.07±37.89	91.60±30.42	
PNIF max	139.02±37.62	97.11±27.13	<0.0001

Results (n = 100)

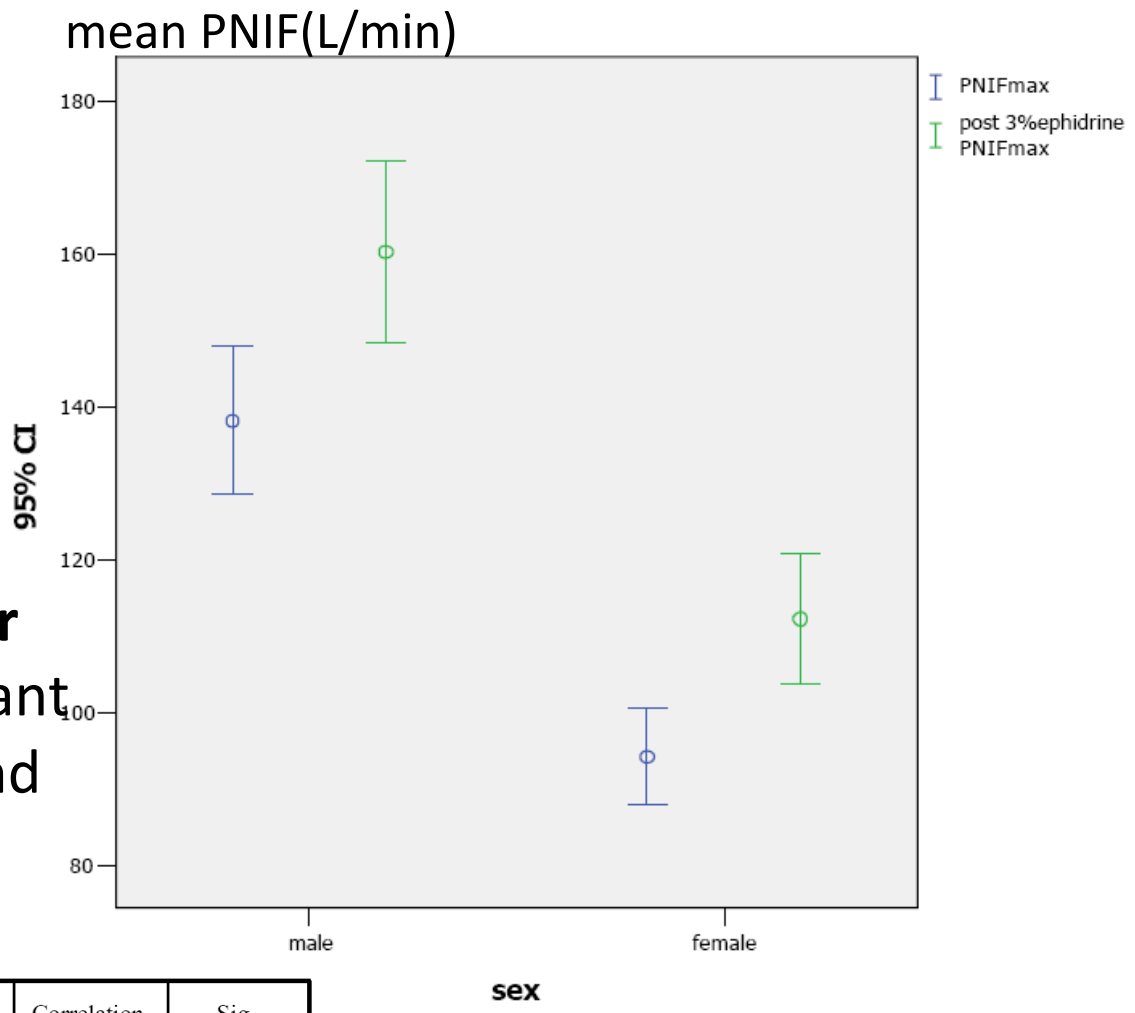
T-Test

mean PNIF Male vs Female : before & after 3% ephedrine

	sex	N	Mean	Std. Deviation	Std. Error Mean
pnifprem PNIFmax	1 male	55	138.091	35.6486	4.8069
	2 female	70	94.100	25.9995	3.1075
postmax post 3%ephidrine PNIFmax	1 male	55	160.182	43.7476	5.8989
	2 female	70	112.143	35.9203	4.2933

Results (n= 100)

mean PNIF **before-after** 3% ephedrine : significant change in both male and female subjects



sex			N	Correlation	Sig.
1 male	Pair 1	pnifprem PNIFmax & postmax post 3%ephidrine PNIFmax	55	.837	.000
2 female	Pair 1	pnifprem PNIFmax & postmax post 3%ephidrine PNIFmax	70	.814	.000

Table 3: Peak nasal inspiratory flow rate (PNIF) and the associated factors (N=180)

	PNIF	
	r	p
Age	0.37	
Weight	0.85	
Height	0.61	
BMI	0.96	
Sex	0.55	<0.001

- Table 4: Peak nasal inspiratory flow rate (PNIF) and Rhinomanometry values. (N=180)

	PNIF	
	r	p
Airway resistance	-0.27	0.0075
Nasal Flow Rate	0.26	0.0094

Disscussion

- Fairley FW et al, has demonstrated a good correlation between PNIF and the subjective sensation of nasal patency in adult
- Cho et al, showed PNIF is reproducible in the evaluateion of nasal airway obstructions

Mean PNIF (L/min)	Male	Female
Gaincarlo et al	137	115
This study	138	94

- Gaincarlo et al, were produced relating PNIF to age, sex, and height, In this study was showed correlating PNIF to sex, height and body weight
- PNIF is a cheap, simple, easy to performed method to assess nasal patency with hygienic advantages over expiratory flow device


Thank you