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Douglas Melzer
Pacific University

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Incidence of eye and vision characteristics of a low income population seeking optometric services

Abstract

Results of 1564 optometric examinations, performed over a one year period, were recorded according to age, sex, race, method of pay, incidence of pathology, refractive sphere, refractive cylinder, presbyopic and functional add power, visual dysfunction, and tonometry. The examinations were performed on a low income population at an optometric clinic located within a county health center.

Degree Type

Thesis

Degree Name

Master of Science in Vision Science

Committee Chair

William Berman

Subject Categories

Optometry

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**INCIDENCE OF EYE AND VISION CHARACTERISTICS
OF A LOW INCOME POPULATION
SEEKING OPTOMETRIC SERVICES**

A Thesis Presented to the
Faculty of Pacific University

In Partial Fulfillment
of the Requirements
for the Degree
Doctor of Optometry

Submitted by
Douglas Melzer

Advisor: William Berman, O.D.

May 1987



Douglas Carl Melzer, B.S.



William Berman, O.D.

Douglas Carl Melzer: Pacific University College of Optometry '83 - '87, O.D. 1987, Pacific University College of Arts and Sciences '81 - '83; B.S. 1985, future plans include Private Practice (general practice, contact lens, vision therapy).

William J. Berman, O.D. Illinois College of Optometry '75 - '79, O.D. 1979, B.S. 1977, Pasadena City College '73 - '75, Simon Fraser University '70 - '73, future plans include continuation of faculty position at Pacific University College of Optometry and private practice.

ABSTRACT:

Results of 1564 optometric examinations, performed over a one year period, were recorded according to age, sex, race, method of pay, incidence of pathology, refractive sphere, refractive cylinder, presbyopic and functional add power, visual dysfunction, and tonometry. The examinations were performed on a low income population at an optometric clinic located within a county health center.

INTRODUCTION:

The urban population of Portland, Oregon is contained within the county of Multnomah. Multnomah County Health Services Division is a component of the Department of Human Services, one of the four main branches of county government ¹. The Health Services Division (HSD) is a non-profit, public health agency responsible for protecting the health of the community through disease surveillance, promoting healthy behaviors, and providing health care services ². The HSD serves a population of 562,036 within Multnomah County ³. The Peck Health Center is one of several county operated community health centers within the HSD, serving a population of 146,661 ⁴.

The Peck health center provides medical, dental, and optometric services. The optometry clinic was established in 1980 through contract with Pacific University's College of Optometry in Forest Grove, Oregon. The College of Optometry supplies the man power by sending 4th year interns to the Peck Health Center. The interns are scheduled into fourteen week rotations and are supervised by a faculty staff Optometrist. Examinations, performed by the interns, are scheduled by appointment.

The optometric clinic, being the only county administered provider of optometric services, draws patients from outside the Peck health center district. The majority of patients live within a 2 mile radius of the center. County medical, nurse practitioner, and nursing providers refer patients to the optometric clinic. Referrals are not required and individuals may schedule appointments by telephone calling the appointment clerk.

Fees for service are closely aligned with usual and customary fees of private optometric practitioners. Fees for service are sliding scaled based on household income and the number of household members. Materials are provided on a cost basis. The sliding scale for fees for service is broken down into five categories. These five categories reflect the various discounts the client is entitled to based on their income/household member situation. The maximum fee or 100% pay means the patient pays the entire fee. The next level of discount is 75% pay where the patient receives a 25% discount. The third scale is 50% pay level. The fourth scale is the 25% pay level. This determines the patient is responsible for 1/4 of the services fee, a 75% discount. The last scale is the minimum fee also referred to as 0%. Services fees are reduced to a designated minimum amount. There are no services provided free of charge.

In addition to those patients that receive a sliding scaled fee, the HSD provides services to those patients with medical insurance, medicare and welfare coverage. Upon arriving at any HSD clinic a client's "method of pay" is determined. The method of pay will be by insurance coverage, medicare, medicaid, or sliding scaled.

Public health clinics typically serve an indigent, low-income population. This population has not been described in the literature with respect to the status of vision and eye health. The authors wanted to report on incidence of several eye and visual characteristics of a low-income population. This is an incidence study not of the low-income population as a whole but of a low-income population seeking optometric services.

METHOD:

Routine optometric examinations were performed and covered the following areas; patient history, external eye health, internal eye health, tonometry, visual acuity, refractive status, accommodative status, and binocular status. Treatment resulting from the examinations consisted of any of the following; prescription lenses, vision therapy, medical referral, optometric referral, or no treatment. The data collected for this study was limited to the patient's sex, medications, date of examination, age, race, method of pay, presence of pathology, refractive sphere, refractive cylinder, presbyopic or functional add power, binocular dysfunction, tonometry, and whether or not corrective lenses were prescribed. If a patient was referred for other service as a result of the examination this was included in the collected data. The data represents examination results spanning a one year period.

If eye pathology was detected or diagnosed, the structure involved was listed rather than the name of the pathology. For example, if a patient presented with allergic conjunctivitis then the conjunctiva was listed as the site of the pathology. Some pathologies involved more than one structure and therefore all structures involved were listed. A few exceptions to this site-oriented description of pathology were the categories of hypertension, diabetic changes, and glaucoma. These disease processes encompass numerous structures and are also the most sight - threatening. The authors felt they deserved to be singled out. If a patient presented with background diabetic retinopathy then only the category of "diabetic changes" was checked rather than list all

the ocular structures this disease process affected.

The data collection of patient medication was limited to the drug's classification rather than its name. This kept the list to a manageable number.

Refractive sphere powers were converted into four myopia categories, four hyperopia categories, and emmetropia or plano sphere. The four categories were patterned after Borish's⁵ categories of very low, low, moderate, and high refractive error. The ranges of powers for each category are as follows; very low (.25 to .75 D), low (1.00 to 3.00 D), moderate (3.25 to 6.00 D), and high (6.25 and up).

Refractive cylinder powers were converted into three with-the-rule categories, three oblique categories, and three against-the-rule categories. The three categories for each type of astigmatism were dioptric ranges of low, moderate, and high cylinder power with respective values of .25 to .75 D, 1.00 to 2.25 D, and 2.25 and up.

Refractive add power was broken down into three categories or ranges of power; low, moderate, and high. The respective values for these ranges were; low (.25 to .75 D), moderate (1.00 to 1.75), and high (2.00 and up). Refractive add status was classed as functional or presbyopic.

Binocular or visual dysfunctions were confined to 12 categories. The subtle aspects of each category were not listed. For example; exotropia includes all forms of exotropia.

Exophoria includes all patients that displayed exophoric patterns in excess of the expected values as set forth by the Optometric Extension Program ⁶ (Borish p. 906 vol. 2, 1975).

Tonometry was performed by either of two methods and was recorded in millimeters of mercury for right and left eyes. The majority of measurements were made using the Goldmann applanation method. The non-contact method was used to a much lesser extent.

When recording the patient's method of pay, a fourth classification was included which heretofore has not been mentioned. This fourth classification is the Multicare group. This was a program in operation during the year long data collection. It was the prepaid health plan of Multnomah County Health Services Division for indigent and low-income clients. These clients had to enroll in the program after meeting specific requirements. In all, there were eight categories of method of pay; five for the sliding scale and three more for welfare, multicare, and insurance.

Finally, the number of patients who received prescription lenses was tallied.

RESULTS:

1564 patients were examined in one year . Uniform testing was not possible for all these patients. This should be taken into consideration when reviewing the graphs and tables. There will be figures that do not total to 1564 people or 3128 eyes.

SEX: 40.64% (636) of the population seen were male, 59.36% (928) were female.

AGE: **(Table 1:)** Out of 1564 patients, 25% of the population was age 15 or younger. 50% was age 30 or younger. 75% was age 45 or younger. The age groups most frequently seen were in the 11 - 15 year group, 6 - 10 years, 21 - 25 years, 31 - 35 years, 26 - 30 years.

(Tables 2 & 3:) These tables break the above information into male and female groups for a more complete comparison.

RACE: Of the population of 1564, 78.5% (1228) of the patients were Caucasian, 12.8% (206) were Asian, and 8.7% (136) were black.

Method of Pay: Methods of pay were tabulated for 1554 patients. 59.3% (922) were subjected to the sliding scale fee schedule. 25.8% (401)

were enrolled in the multicare plan. 13% (202) were on welfare. 1.9% (29) had medical insurance. The sliding scale with its five categories had most of the 59.3% in its minimum fee level. 83.5% (770) of the sliding scaled patients were at minimum pay. 10.5% (97) were in the 25% pay category. 3.8% (35) were in the 50% pay category. 1.5% (14) were in the 75% pay category. 0.65% (6) were in the 100% pay category.

Medication: **(Table 4:)** 567 (36.25%) patients reported taking one or more medications. The 5 most commonly reported medications were antihypertensives (8.18%), antiinflammatory / analgesics (6.26%), cardiovascular (3.32%), antidiabetics (3.32%), hormones (2.68%). Refer to Table 3 for type and incidence of medications.

Pathology: **(Table 5:)** 537 (34.33%) presented with ocular pathology. The five most commonly observed ocular pathologies involved the lens (10.99%), the lids (10.86%), the conjunctiva (10.42%), the cornea (9.20%), and the retina (4.02%). Background diabetic retinopathy was found in .89% of this population. Glaucoma was found to be in .38% of this population.

Refractive Sphere: **(Table 6:)** 2897 eyes were refracted for determination of

sphere refractive error. 44.26% of these eyes were myopic, 46.38% were hyperopic, 9.35% had plano refractive sphere. Of the four categories, the "low" range of 1.00 to 3.00 Diopters had the highest incidence for both myopia and hyperopia. 22.20% of all refracted eyes were in the low myopic range. 22.02% were in the low hyperopic range. High refractive sphere (6.25 Diopters and up) was reported in 2.45% of the refracted eyes. 1.28% were high myopes and 1.17% were high hyperopes.

Refractive Cylinder: **(Table 7:)** 70.6% of all eyes refracted displayed refractive cylinder. With-the-rule refractive cylinder was reported in 42% of 2045 eyes with refractive cylinder. Against-the-rule cylinder was reported in 43% of 2045 eyes. Oblique cylinders were found in 14.5% of the eyes with refractive cylinder. 58% of all eyes reported to be astigmatic fell into the low range of .25 to .75 Diopters. 7.8 % of all eyes reported to be astigmatic fell into the high range of 2.50 Diopters and up.

Refractive Add Status: **(Table 8:)** 39% of all refracted eyes required functional or presbyopic add power. 91.32% of those eyes requiring add power, were for functional reasons. 8.49% of the 8.67% requiring functional add power, were in the low and moderate ranges, (.25 to .75 D) and (1.00 to 1.75 D). 86.9% of the 91.32%

ranges, (.25 to .75 D) and (1.00 to 1.75 D). 86.9% of the 91.32% requiring presbyopic add power, were in the moderate and high power ranges, (1.00 to 1.75 D) and (2.00 and up).

Visual Dysfunction: **(Table 9:)** Visual dysfunction was reported in 477 of 1564 patients, or 30.5%. 7.3% of 1564 patients were found to be esophoric. This represents 23.9% of those patients with visual dysfunction. 6.3% of the patients displayed accommodative dysfunction. This represents 20.5% of those patients with visual dysfunction. 2.69% of 1564 patients were exotropic or 8.8% of the population exhibiting dysfunctions. 1.5% of the patient population displayed esotropia representing 5% of the patients with visual dysfunction.

Changes in Rx: It was documented that following the examination 1001 of the patients receiving a refraction (65% of the patient population) required a change in prescription lenses either from a present pair or from an uncorrected state. The remainder of the patient population tested needed no change.

Tonometry: **(Table 10:)** Tables 10 & 11 show the percentage breakdown of the IOP in mm Hg for the right and left eyes respectively. Of the 1195 right eyes tested, 12mm, 14mm,

16mm, and 18mm were the most commonly documented IOPs at (17.61%), (13.12%), (11.88%), and (9.63%) respectively. Approximately 35% of the patients had IOPs of 12 mm or less, with greater than 55% at 14mm or less, and greater than 75% at 16mm or less. 2.49% of the patients tested had suspicious IOPs of 22mm or higher ranging up to 26mm Hg.

(Table 11:) Of the 1195 left eyes tested, 12mm, 14mm, 16mm, and 18mm were also the most commonly documented IOPs at (16.40%), (15.40%), (10.38%), and (9.12%) respectively. As with the right eyes, approximately 35% of the patients had IOPs of 12 mm or less, with greater than 55% at 14mm or less, and greater than 75% at 16mm or less. 2.76 % of the patients tested had suspicious IOPs of 22mm or higher ranging up to 26mm Hg.

(Table 12:) This table overlays the prior two for ease of viewing. It is merely a superimposition of the left and right data findings.

(Table 13:) 51% (609) of the 1195 patients tested had no variation in IOP from left to right eyes. 91.1% (1089) of those tested had a variation of 2mm or less. 8.9% (106) had a variation of 3mm or more. Considering only those with greater than 3mm Hg variation reveals only 3.8% (46) of those patients tested for IOP.

TABLE 1

Patients By Age Group (%)

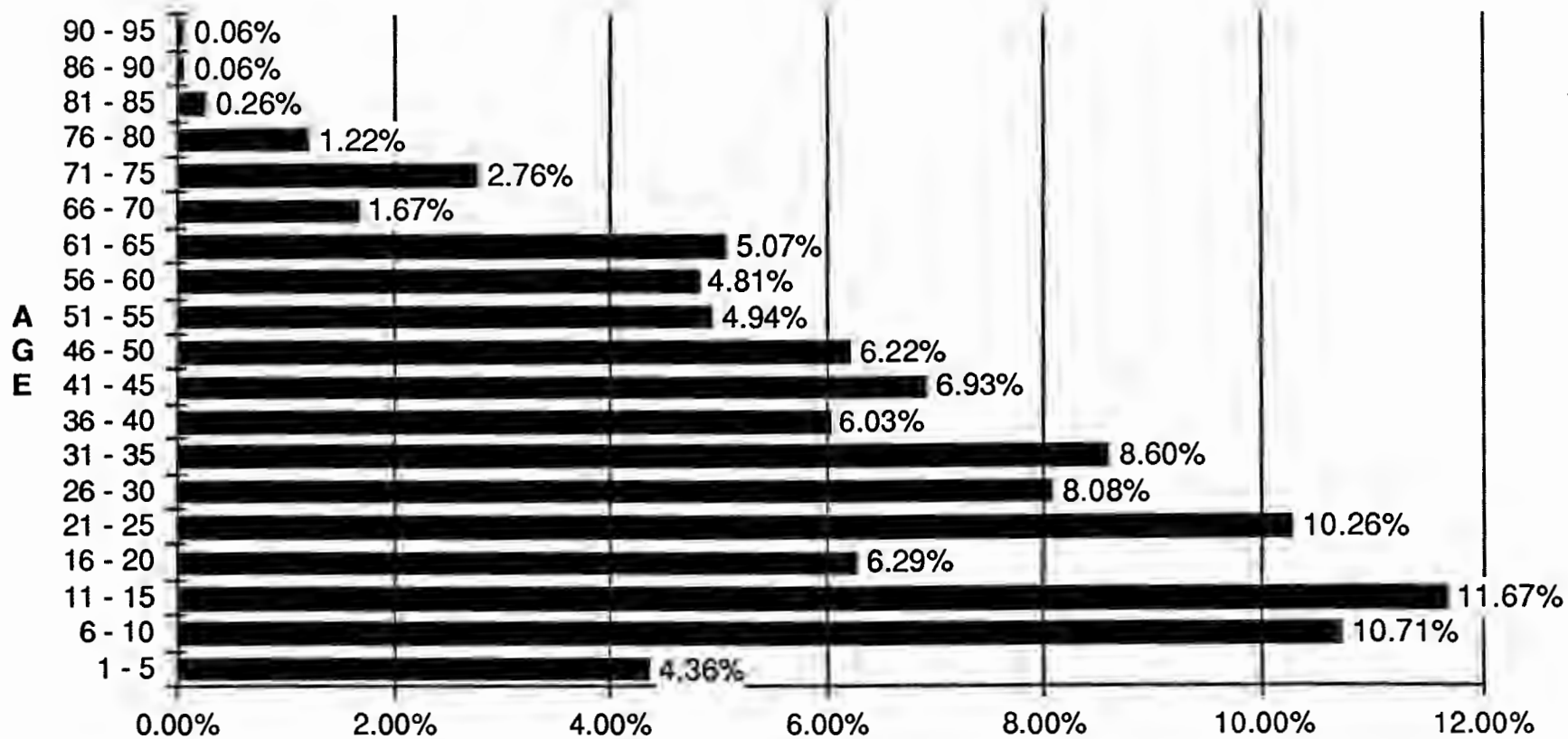


TABLE 2

Male Patients By Age Group (%)

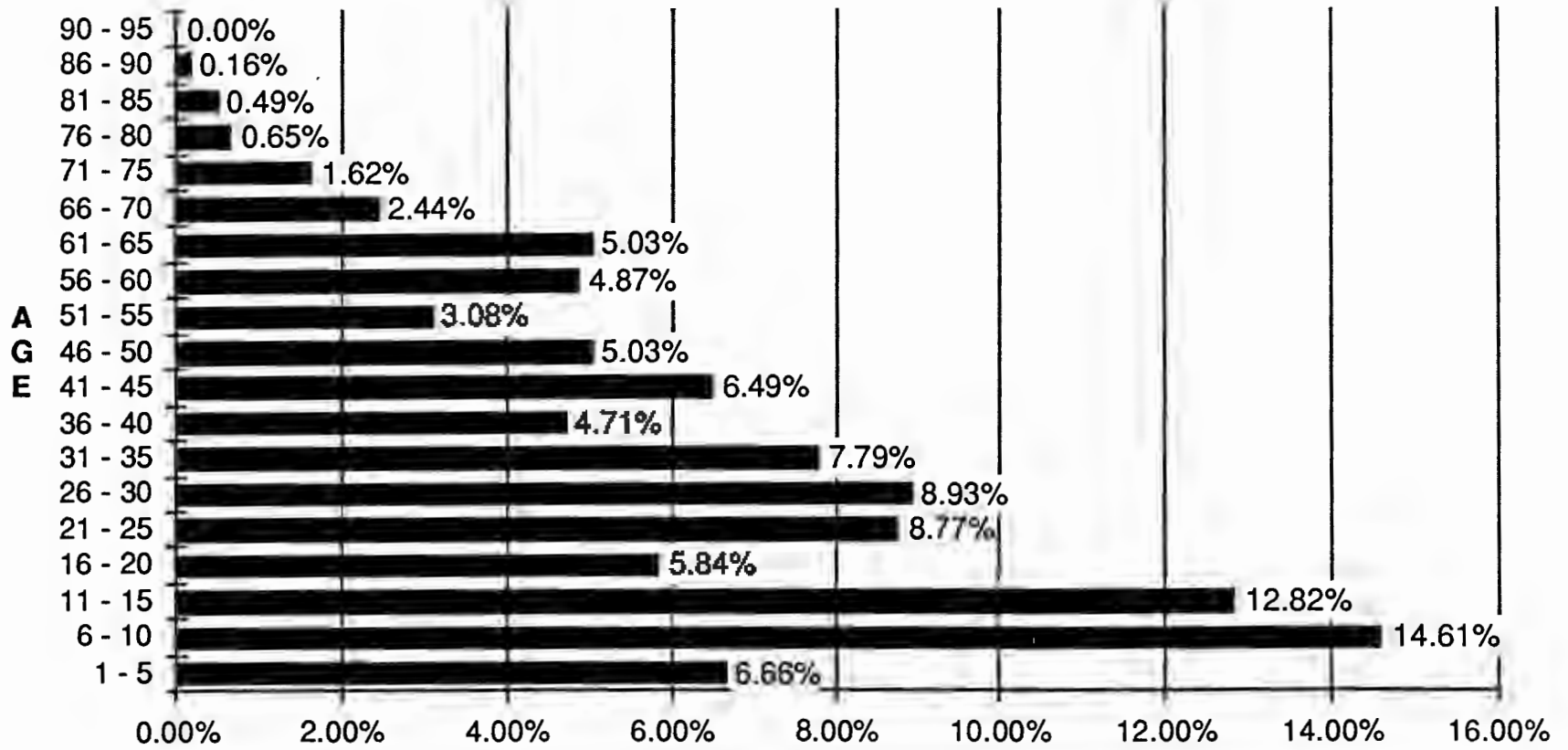


TABLE 3

Female Patients By Age Group (%)

15

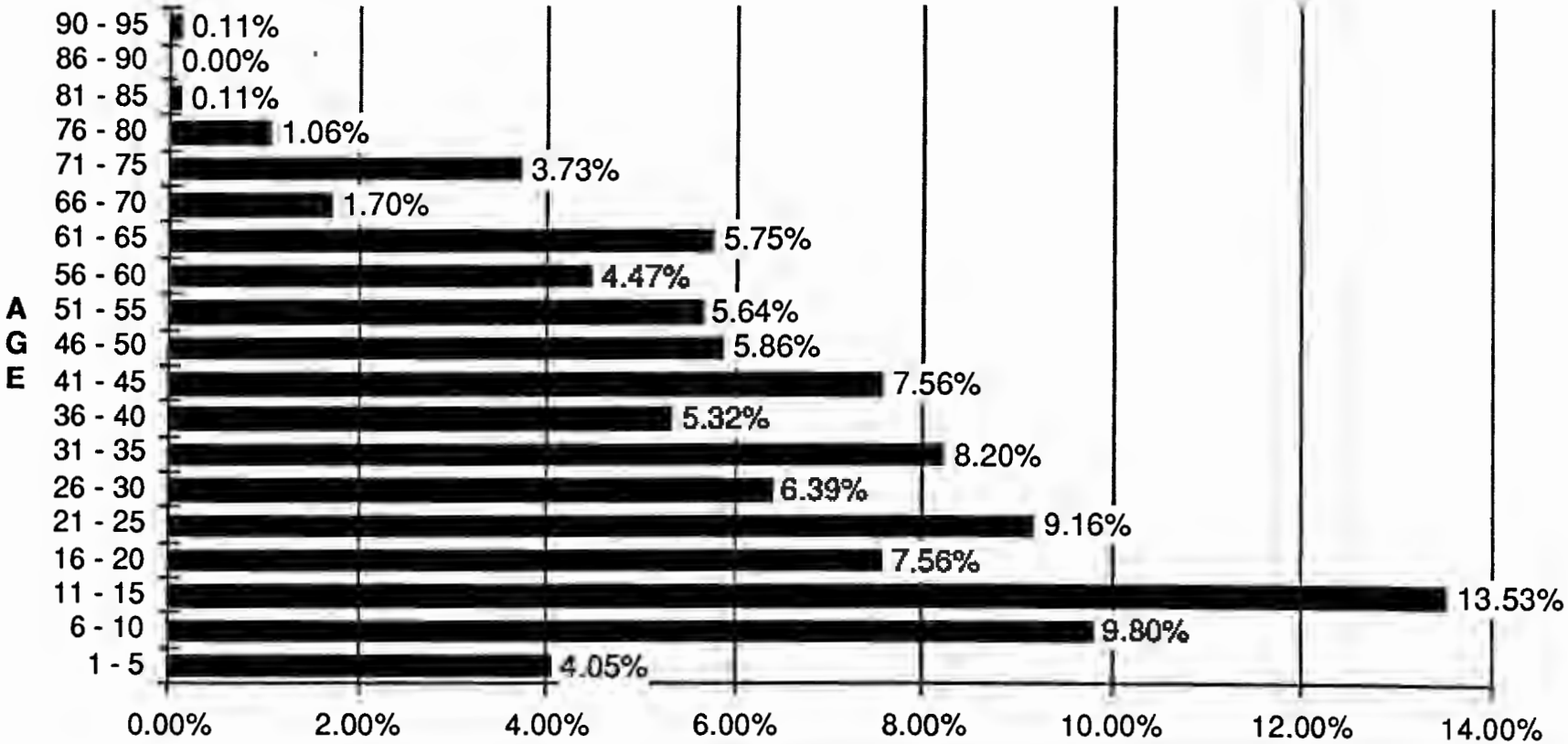


TABLE 4

Medication History (Patients / Medication Type)

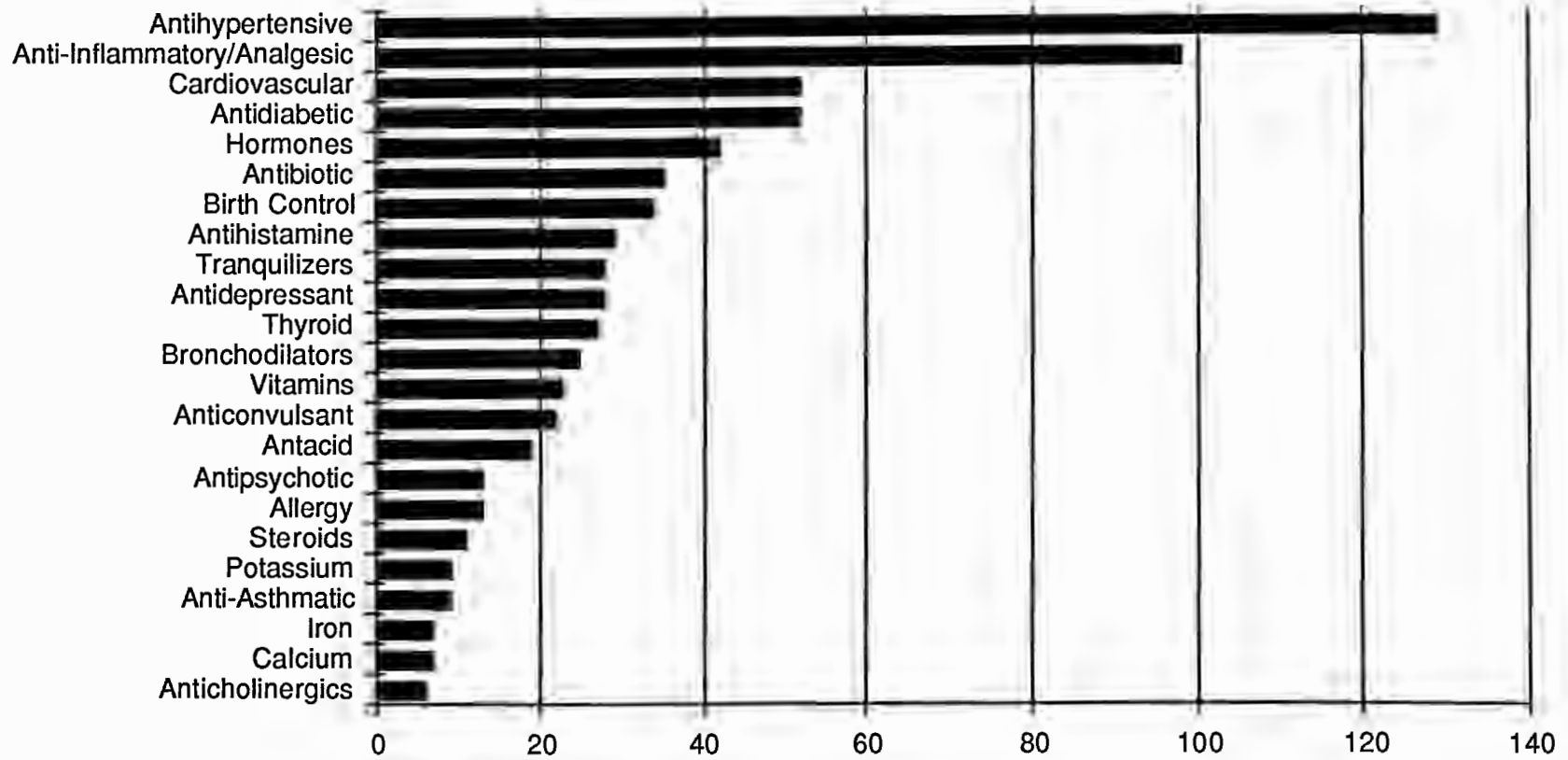


TABLE 5

Incidence of Pathology - 537 of the 1564 Patients

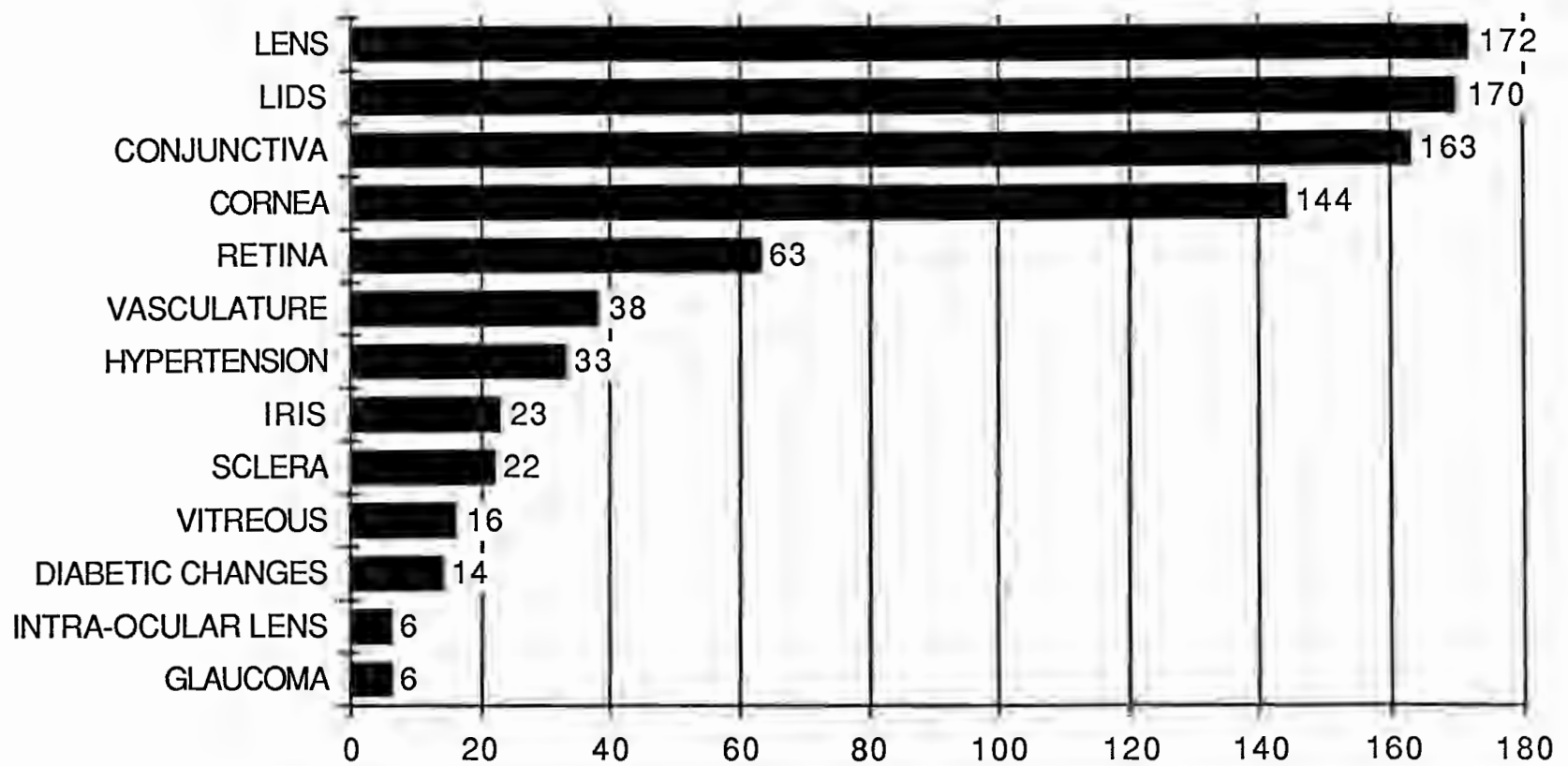


TABLE 6

Refractive Sphere Status - Percent of 2897 eyes

18

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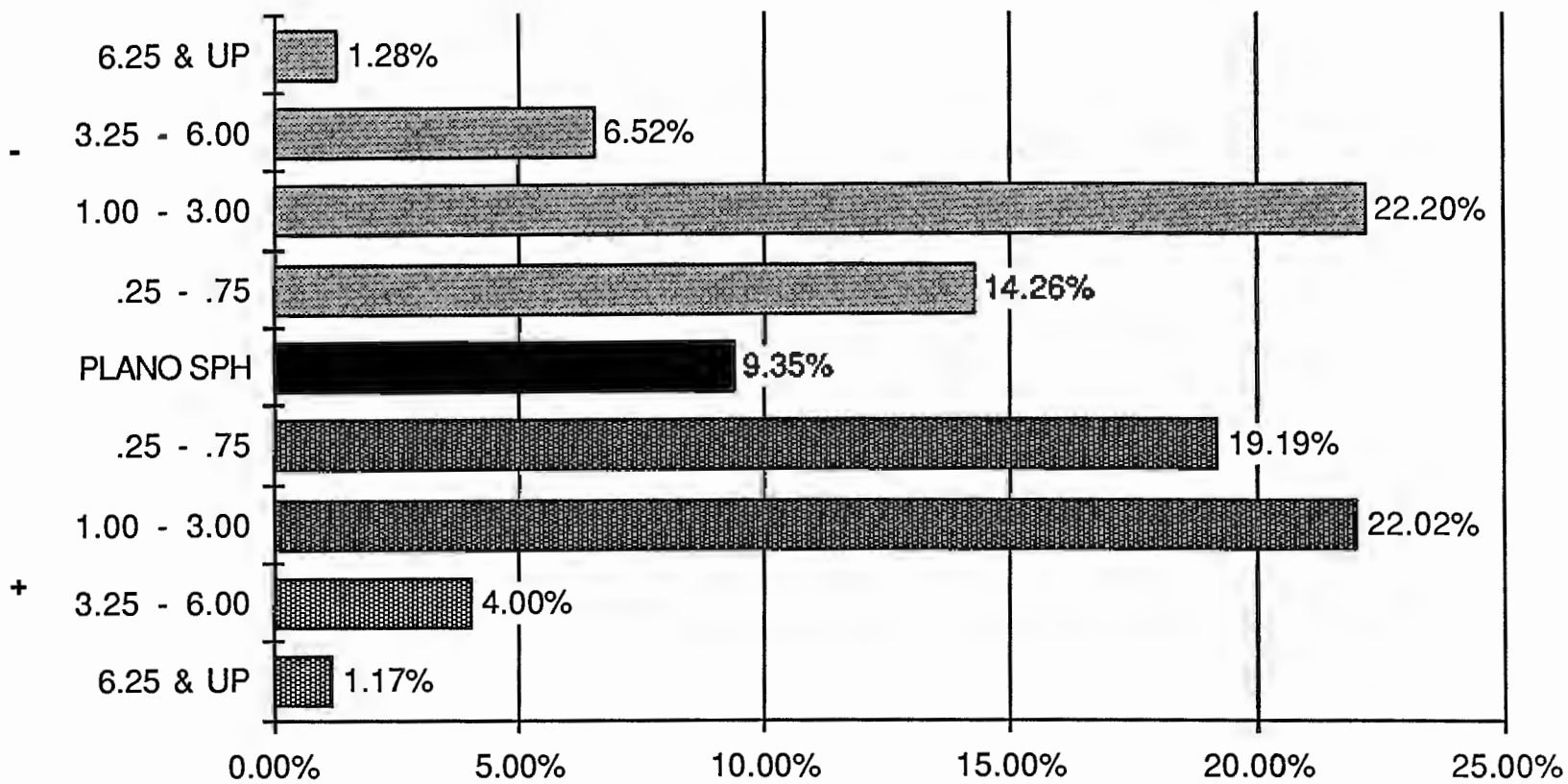


TABLE 7

Refractive Cylinder Status - Percent of 2045 eyes

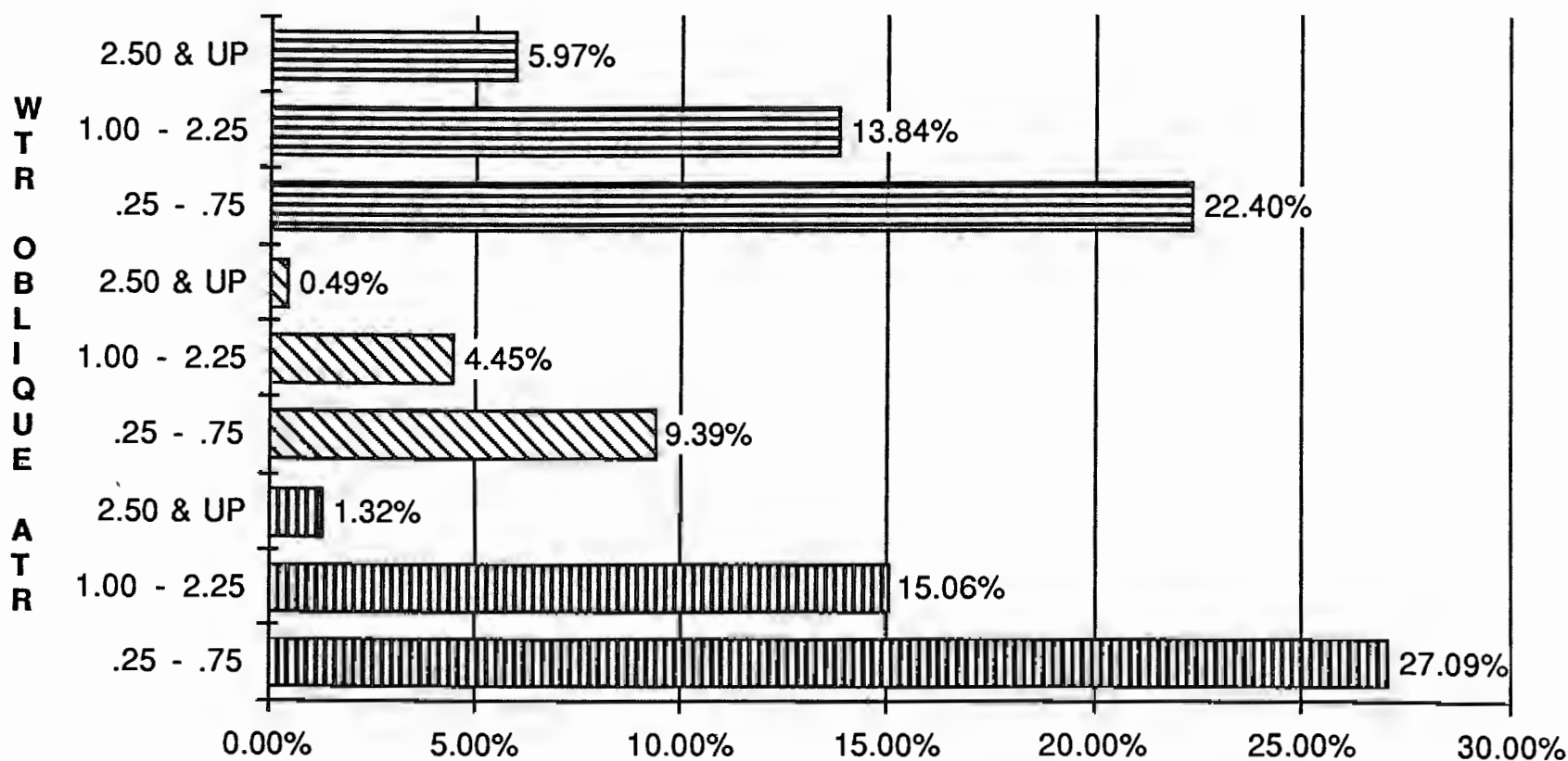


TABLE 8

Refractive Add Status - Percent of 1130 eyes

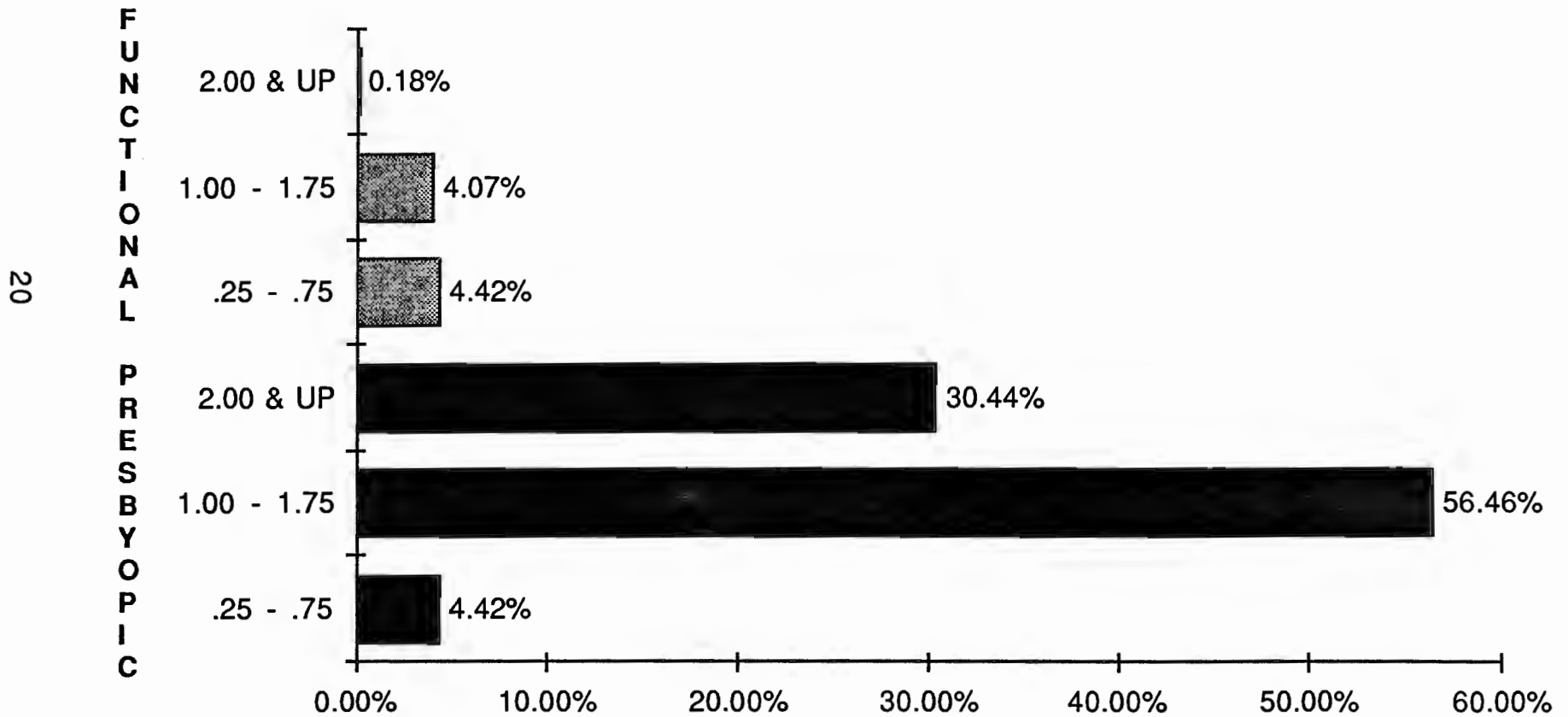


TABLE 9

Visual Dysfunctions (observed in 477 of 1564 patients)

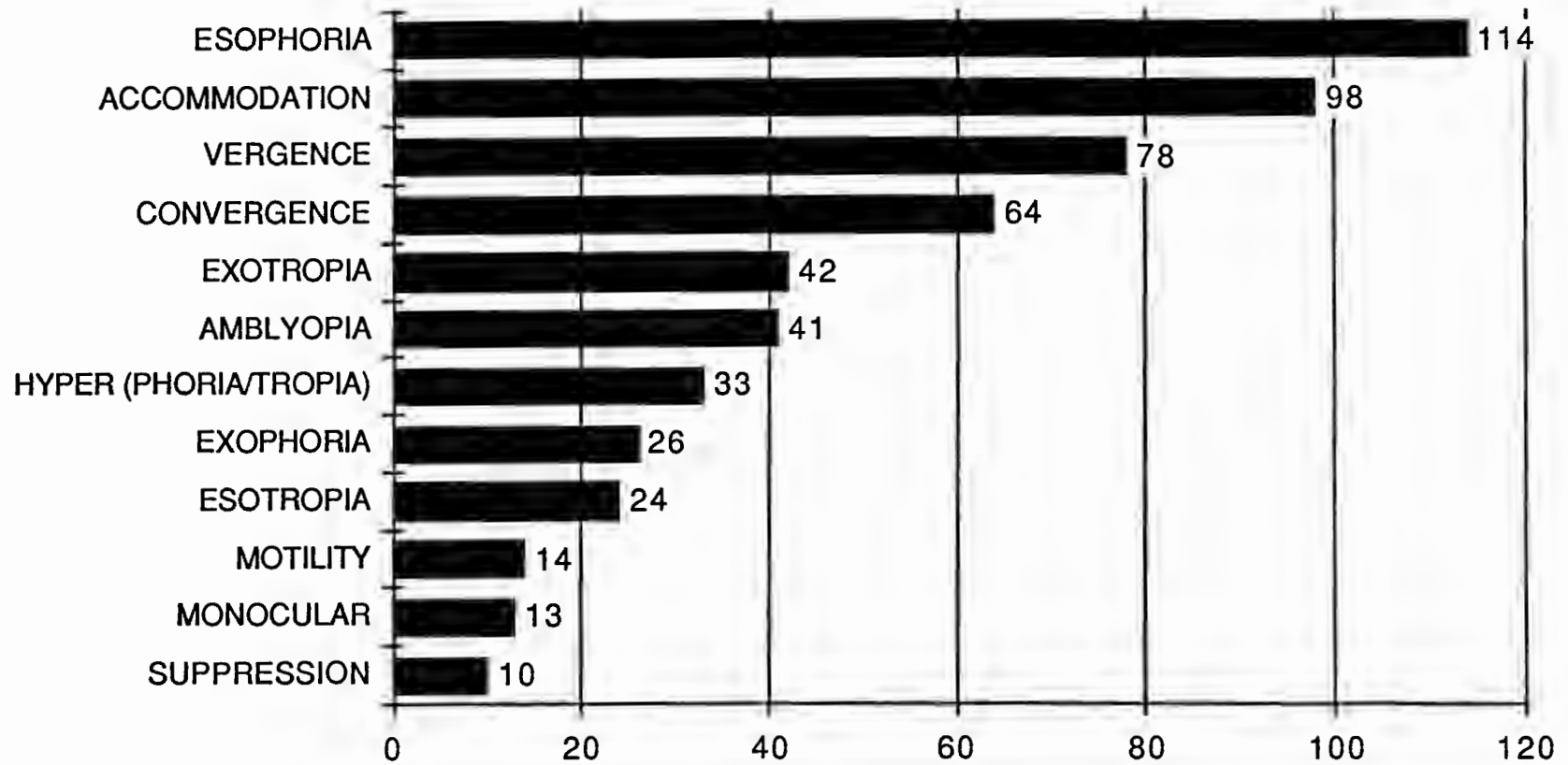


TABLE 10

Right IOP - 1195 eyes

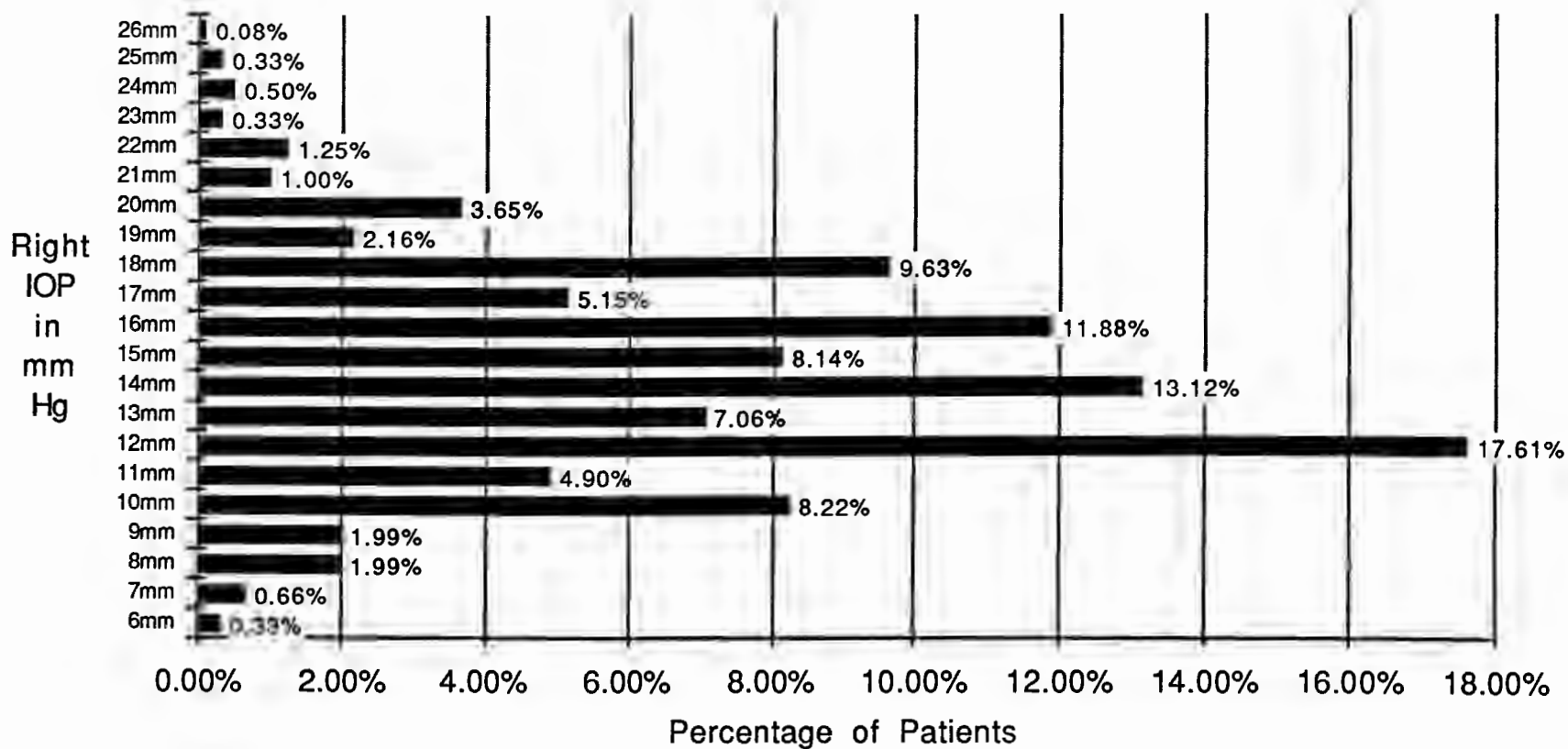


TABLE 11

Left IOP - 1195 eyes

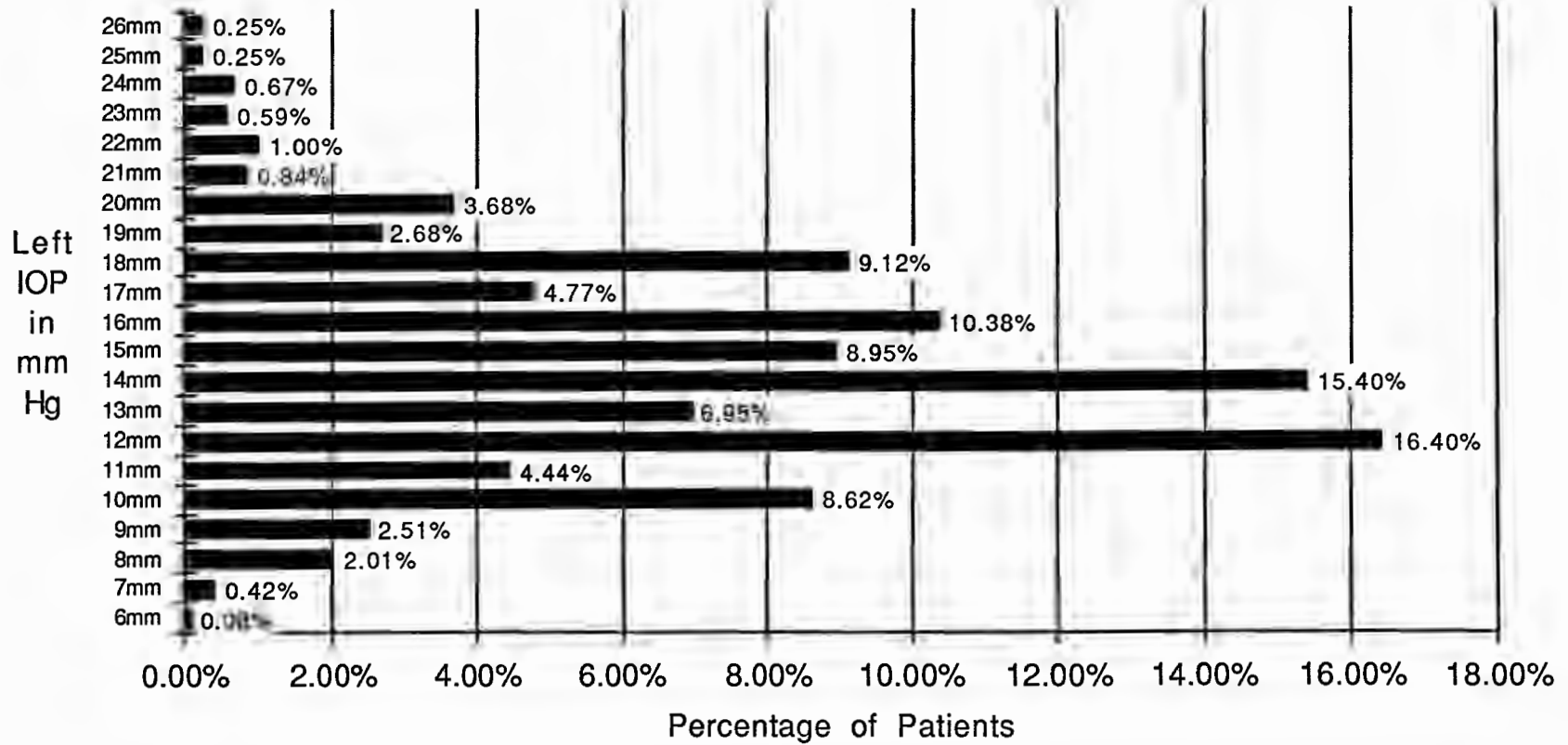


TABLE 12

Right and Left IOP - 1195 eyes

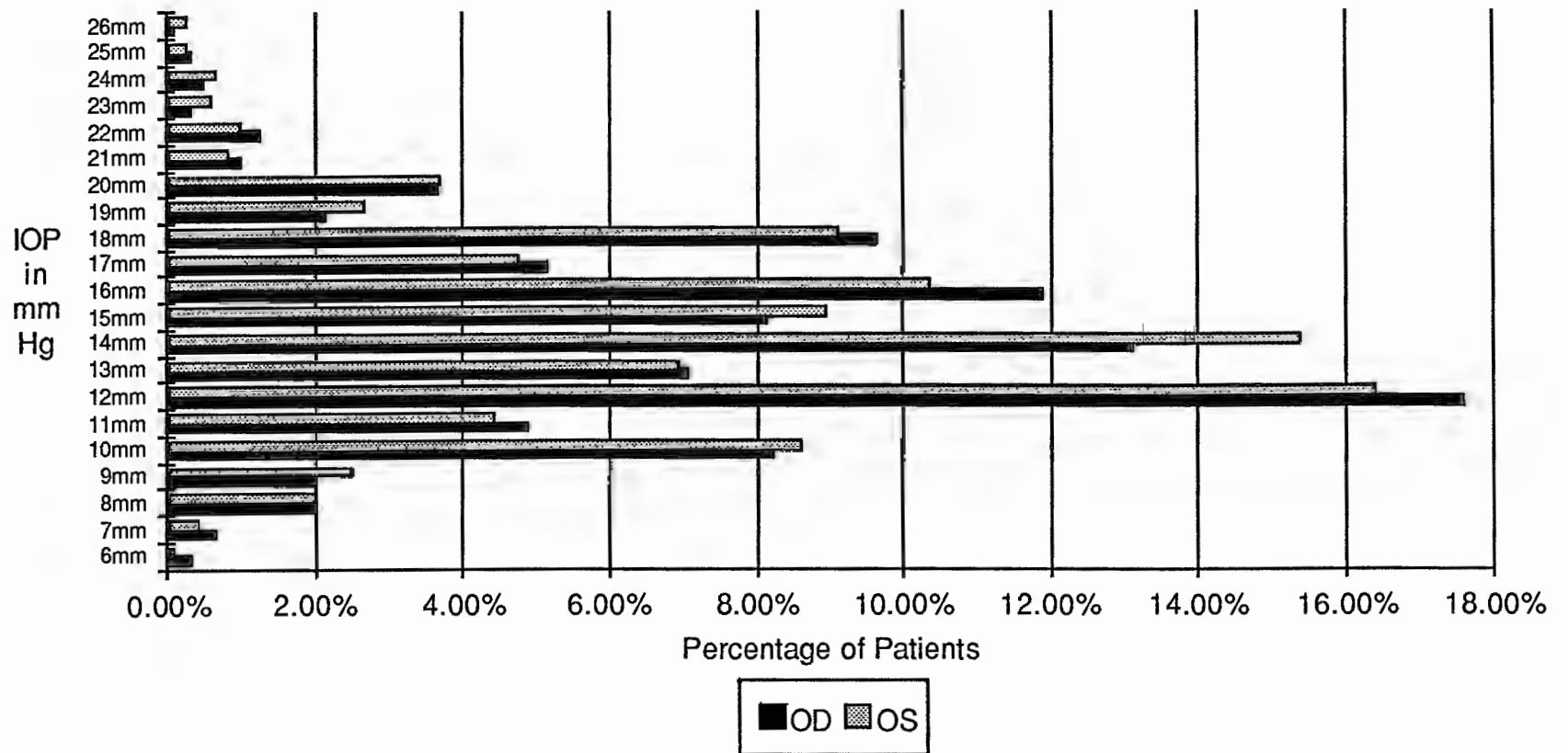
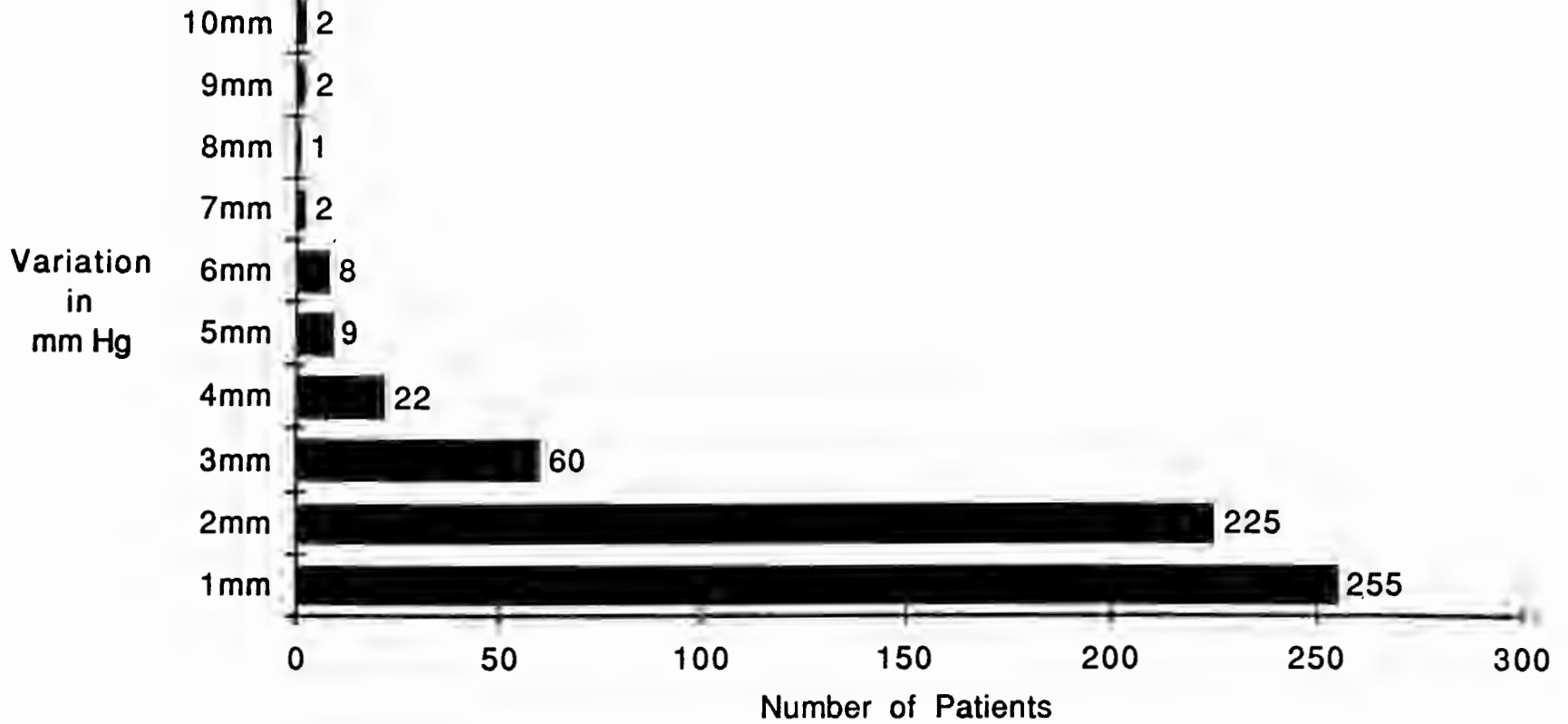


TABLE 13

IOP Variation Between Right & Left Eyes

25



DISCUSSION:

Although it would be desirable for every subject to have undergone a standardized examination procedure, in the process of this research it was not feasible with the normal operation of the clinic. As was noted prior, some patients were not subjected to a full battery of tests so not every area represents the total 1564 patients. For all of the categories the incidence levels reflect only those patients that received testing in that area.

It should be noted that the Medication and Pathology charts represent the items that appeared 5 or more times. There were approximately 6 categories in each that had just a few incidences and were of lesser consequence relative to the larger scale data.

Regarding the Refractive Sphere and Cylinder each eye was treated separately in terms of data findings. This allowed analysis when the two eyes fell into two different spherical or cylindrical categories. The Refractive add status was treated on a per patient basis, with very little occurrence of unequal add powers.

As with the Medication and Pathology charts, the Visual Dysfunction table represents the incidence of 10 or more. As before some less significant (9 or less occurrences) findings were left off the table.

All other charts are representative of all the data from their respective classification.

CONCLUSION:

In conclusion, this is an area in public health statistics that merits further evaluation. Comparison of findings from this project (as a low income patient population) could be compared with that of a standard patient population. Unfortunately present data available on the general public regarding these areas is not readily accessible. Data also was not able to be compared with large census type findings due to the lack of compatibility of classifications and the very nature that this patient population is one that is seeking medical assistance.

Further research is indicated to establish data for low income groups as a whole in addition to those who are seeking optometric services.

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