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· 眼科学基础及临床研究进展 ·

## 河北省永年县成年人主要致盲眼病现状调查： 邯郸眼病研究进展报告

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**【摘要】** 邯郸眼病研究是以人群为基础的横断面眼病流行病学研究, 于2006至2007年经随机整群抽样在河北省邯郸市永年县13个村的30岁以上人群选取7 557人。所有入选人员进行既定的眼部和全身检查, 以及进行标准问卷调查, 主要包括自动验光、主观验光、自动血压计测量血压、身高、体质量、标准心电图、压平式眼压计测量眼压、裂隙灯检查、散瞳后眼底照相。并抽取空腹血样进行血糖、血脂、肾功能等生化检查。共完成6 830例受试者的检查, 应答率为90.4%。本综述报告了邯郸眼病研究人群中盲、视力损害、屈光不正、糖尿病视网膜病变、视网膜前膜以及正常人光学相干断层成像(optical coherence tomography, OCT)测量黄斑厚度值等的的数据。邯郸眼病研究的数据将为我国北方农村地区人群的主要致盲性眼病的患病情况提供重要信息, 从而为我国公共卫生领域防盲政策的制定等提供参考依据。

**【关键词】** 邯郸眼病研究; 流行病学; 眼科学; 人群为基础的研究

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### The Handan Eye Study: A Review

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**【ABSTRACT】** The Handan Eye Study is a population-based and epidemiological investigation of cross-sectional ophthalmopathy which included 6 830 Han people from 7 557 subjects at the age over 30 years in 13 villages of Yongnian County, Handan city, Hebei province in 2006-2007. The interviews covered demographic, behavioral, and ocular risk factors as well as health-related and vision-related quality of life. Ocular examination included measurement of visual acuity (VA), intraocular pressure, anterior and posterior segment examinations, visual field testing, fundus and optic disc photography. Physical examination included measurement of height and weight, blood pressure, electrocardiogram, fasting blood glucose, lipid levels, urea nitrogen and creatinine as well as tests of physical function including walking speed. Of the 7 557 individuals eligible for Handan Eye Study (HES), 6 830 (90.4%) subjects participated the study. We present normative data for refractive error, frequency and causes of visual impairment and blindness, prevalence of epiretinal membranes, diabetic retinopathy and the normal OCT-measured macular thickness in healthy eyes of adult Chinese persons. These data from the HES will provide key information about the prevalence, risk factors, impact, and trends of ocular disease in rural regions of China and may be helpful for dealing with public health issues in China.

**【KEY WORDS】** Handan eye study; epidemiology; ophthalmology; population-based study

### 1 研究背景

眼与视觉疾患严重妨碍人民的生活质量, 随着我国社会经济的快速发展以及人口老龄化的进程, 致盲疾病谱正在发生改变, 这必将影响我国防盲政策的制定及防盲资源的配置。政策制定的前提是明确我国

致盲眼病的现状, 以使我国眼病防治规划建立在更为可行的基础之上。眼病流行病学研究是开展防盲治盲的基础性工作之一。国外在眼科领域开展了许多以人群为基础的研究, 如美国的巴尔的摩眼病调查(The Baltimore Eye Survey)、威斯康星 beaver dam 眼病研究(The Beaver Dam Eye Study)、洛杉矶拉丁人眼病研究(The Los Angeles Latino Eye Study)等<sup>[1-6]</sup>, 澳大利亚的蓝山眼病研究(the Blue Mountains Eye Study)等<sup>[7-10]</sup>, 欧洲的鹿特丹研究(The Rotterdam Study)、哥本哈根眼病研究(the Copenhagen City Eye Study)

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等<sup>[11-15]</sup>,新加坡的 Tanjong Pagar 调查 (the Tanjong Pagar Survey)、新加坡马来人眼病研究 (the Singapore Malay Eye Study)<sup>[16-23]</sup>,以及日本的 The Tajimi 研究和 Hisayama 研究等<sup>[24-28]</sup>,以上研究均为了解该地区疾病的分布及其特征并为公共卫生政策以及防盲策略的制定提供了依据<sup>[29-34]</sup>。

我国作为世界人口大国,已开展了一些以人群为基础的 eye 病流行病学调查,如北京顺义眼病调查、广州荔湾眼病研究、上海北新泾街道眼病调查以及北京眼病研究等<sup>[35-52]</sup>,但是主要集中在广州、北京、上海等大城市或城市的近郊区等经济条件远高于全国平均水平的地区,而对于仍占我国人口大多数 (64%) 的农村地区的人群,眼病流行病学情况了解甚少<sup>[53-54]</sup>。

目前,我国眼与视觉科学资源十分有限,且眼科技术力量多数集中在大中城市,广大农村地区眼科力量相当薄弱,城市和农村之间防盲治盲工作的开展存在相当严重的不平衡现象<sup>[55]</sup>。根据近十几年来防盲治盲工作的实践,防盲治盲工作的重点主要是在农村地区。2005 年,国家中长期发展规划指出我国医疗卫生工作的重心要前移、下移,要重视农村社区工作,因此,提高我国初级眼保健质量,提高人群眼病防治能力,是我国卫生事业的发展状况与眼病需求,也是人民群众的健康需求。

## 2 邯郸眼病研究简况

邯郸眼病研究 (the Handan Eye Study, HES) 是在我国河北省邯郸市永年县农村地区进行的以人群为基础的 eye 病研究,以了解我国北方农村常见致盲性眼病流行病学情况。邯郸地处华北平原,农村人口占总人口大多数,农村居民人均纯收入接近 2005 年全国水平,其人口学特征与 2000 年全国第五次人口普查的数据相比较具有可比性<sup>[56]</sup>,邯郸地区共有 3 家医院可提供眼科医疗服务,每年完成白内障手术约 350 例,该地区白内障手术率 (cataract surgical rate, CSR) 与我国平均水平接近<sup>[57]</sup>。

邯郸眼病研究的目的有: 了解邯郸农村地区盲与低视力的患病率和临床特征; 了解邯郸农村地区主要致盲眼病: 白内障、青光眼、屈光不正、老年性黄斑变性、糖尿病性视网膜病变等的患病率及患病特征; 了解社会经济因素对眼病发生的影响; 了解视力损害对患者生活质量的影响; 了解我国现行医疗体系下眼病患者的保健意识以及诊治现状。

邯郸眼病研究方案经首都医科大学附属北京同仁医院伦理委员会审核通过。本研究人群抽样方案由北京大学公共卫生学院卫生统计学系完成,以村为基本抽样单位,采用分层、整群、概率比例抽样方法抽取调查对象,通过样本估计总体的情况。在永年县 458 个行政村中随机抽取 13 个行政村 50 岁以上全部人口,以及其中 6 个行政村中含 30 岁以上的人群,经入户核实后入选合格人口为 7 557 人。

为保证研究质量,作者在永年县医院设立中央检查中心,并为各村的受试者提供交通保障接到中央检查中心进行详细的眼科以及全身相关检查。另外,对于少数不能来中央检查中心的受试者在该村卫生所设临时检查点进行部分检查,对于极少数年老体弱长期卧床的受试者进行家访检查。

在中央检查中心全部受试者经身份审核、注册并签署知情同意书后,完成以下流程检查项目: 空腹血样采集、尿样采集、问卷、体格检查 (包括身高、体质量、腰臀围、血压、脉搏)、自动验光、视力检查、主观验光、眼压测量、裂隙灯检查、前节光学相干断层成像 (OCT)、A 超、晶体分级、散瞳眼底照相、后节 OCT 等。部分受试者还需完成视神经相关检查,视野、房角镜等检查。在村卫生所临时检查点或家访检查中进行简化项目的检查。

从 2006 年 10 月至 2007 年 10 月进行了现场检查工作,共完成 6 830 位受试者的检查,应答率为 90.4%,其中 5 909 人 (86.5%) 在中央检查中心完成,807 人 (11.8%) 在村卫生所完成检查,114 人 (1.7%) 为家访检查。

## 3 邯郸眼病研究主要疾病结果

### 3.1 盲和视力损害<sup>[58]</sup>

采用世界卫生组织的定义,即最佳矫正视力 < 20/60 但是 20/400 为视力损害,最佳矫正视力 < 20/400 为盲。由 2 位眼科医师根据其临床检查情况和检查表记录情况判断盲或视力损害的原因,若二者判断不一致,再由另一位高年资眼科医师判断并以此作为最终判断。在邯郸眼病研究中,30 岁以上人群经与第五次全国人口普查中农村人群进行年龄、性别校正后,依据生活视力双眼盲和双眼视力损害的患病率分别为 0.6% 和 4.7%,依据最佳矫正视力双眼盲和双眼视力损害的患病率分别为 0.5% 和 1.0%。盲和视力损害均与年龄呈强相关。根据生活视力判定,白内

障是双眼盲的主要原因(36.6%),未矫正的屈光不正为视力损害的主要原因(78.4%)。但是经视力矫正,白内障均为盲(41.9%)和视力损害(48.2%)的首位原因,其余常见的盲因分别为近视性视网膜病变(16.1%),青光眼(9.7%)和角膜浑浊(9.7%)。因此,与北京眼病研究相比较,邯郸眼病研究盲的患病率与邯郸眼病研究农村限定人群的数据相接近,但是明显高于 BES 的城市限定人群。邯郸眼病研究视力损害的患病率均明显高于邯郸眼病研究城市或农村人群的结果。总之,以农村人群为基础的邯郸眼病研究中盲和视力损害的患病率高于我国既往在城市人群的报道,白内障、屈光不正是主要原因,近视性眼底病变是盲的主要原因之一。

### 3.2 屈光不正<sup>[59]</sup>

近视、高度近视和远视的定义分别为右眼等值球镜(spherical equivalent, SE)  $< -0.5$  diopter(D),  $< -5.0$  D, 和  $> +0.5$  D。散光定义为柱镜小于  $-0.5$  D。屈光参差定义为双眼的 SE 相差大于  $1.0$  D。经与 2000 年全国人口普查的数据进行矫正后,近视的患病率为 26.7% (95% CI, 25.6-27.8),远视为 15.9% (95% CI, 15.0-16.8),散光为 24.5% (95% CI, 23.5-25.5),屈光参差为 7.7% (95% CI, 7.0-8.4)。高度近视的患病率为 1.8% (95% CI, 1.5-2.1)。经多元回归分析,对于低年龄组(30~49岁)近视的相关危险因素为抽烟(OR, 0.7; 95% CI, 0.5-0.9)、近距离阅读时间(OR, 1.2; 95% CI, 1.1-1.4),糖尿病(OR, 7.2; 95% CI, 1.9-17.2)和家庭中患有近视的家庭成员数(每位成员 OR, 1.3; 95% CI, 1.1-1.7);而对于 50 岁以上年龄组人群,教育程度高(OR, 1.8; 95% CI, 1.1-3.1),糖尿病(OR, 1.6; 95% CI, 1.2-2.7),晶体核性浑浊(OR, 1.7; 95% CI, 1.2-2.3)以及家庭中患有近视的家庭成员数(OR, 1.5; 95% CI, 1.1-1.9)为其近视的危险因素。相关报道显示邯郸眼病研究中近视的患病率明显低于新加坡华人(38.7%)、香港华人(40%)以及新加坡马来人种(30.7%)(40 岁以上人群),也低于白种人和黑人,但是与北京眼病研究中近视的患病率比较相接近(22.9%),以上提示环境因素在近视眼的发生发展中起着一定作用。

### 3.3 糖尿病视网膜病变<sup>[60]</sup>

糖尿病诊断标准采用 2003 年美国糖尿病协会推荐标准,即空腹血糖  $\geq 7.0$  mmol/L,或问卷中有明确的既往诊断糖尿病病史者,诊断为糖尿病。使用 Canon

CR-DGi 免散瞳眼底照相机(Canon CR-DGi with a 20D SLR back, Canon, Tokyo, Japan)对所有受试者进行散瞳后眼底照相,一张以视盘为中心,另一张以黄斑中心凹为中心。眼底图像读片员(WFH)事先送到澳大利亚墨尔本大学眼科研究所视网膜血管影像中心进行读片培训,并考核合格。参照美国多种族动脉粥样硬化研究(Multi-Ethnic Study of Atherosclerosis, MESA)制定了本研究的读片方案,以及 DR 读片记录表格。DR 分级标准:为改良的 ETDRS 的分级标准,双眼中较重的眼 DR 的分级为该受试者 DR 分级。应用 Logistic 回归模型进行 DR 相关因素的分析。糖尿病视网膜病变的总患病率为 43.1% (95% CI, 38.1-48.4, 经与 2000 年全国人口普查农村人口进行年龄校正后),其中已知病史的糖尿病患者中 DR 的患病率为 65.2%,新诊断的糖尿病患者为 33.5%。增生性糖尿病视网膜病变、黄斑水肿以及威胁视力的糖尿病视网膜病变的患病率分别是 1.6%, 5.2% 和 6.3%,有 12.1% 的已知病史的糖尿病患者有威胁视力的糖尿病视网膜病变但是未曾治疗。糖尿病视网膜病变的患病率与年龄、性别无差别,而与糖尿病病程呈强相关。在多元回归模型中,与 DR 呈独立相关的因素有糖尿病病程(OR, 3.07; 95% CI 1.94-4.85, per 5 years of duration),血糖水平(OR, 1.17; 95% CI 1.08-1.27, per mmol/L increase)和收缩压水平(OR, 1.22; 95% CI 1.08-1.37, per 10 mmHg increase)。而对于新诊断的糖尿病,与 DR 呈独立相关的因素为血糖水平(OR, 1.17; 95% CI 1.05-1.29, per mmol/L increase)。本研究的数据接近于美国洛杉矶拉美眼病研究(the Los Angeles Latino Eye Study, LALES)中关于拉美人种 DR 的患病率(46.9%)和亚洲新加坡马来人眼病研究(the Singapore Malay Eye Study, SMES)的数据(35.0%)<sup>[61-62]</sup>。但是,本研究的数据高于其他近期的报道,如在白色人种(ranging from 15.3% to 29.0%)<sup>[63-67]</sup>、黑人(27.7%~36.7%)<sup>[66, 68-69]</sup>和印度人(17.6%)<sup>[70]</sup>。事实上,邯郸眼病研究中有关 DR 的数据与近 30 年前美国威斯康星糖尿病视网膜病变流行病学研究(the Wisconsin Epidemiological Study of Diabetic Retinopathy, WESDR)的数据十分接近。本研究结果进一步强调随着我国糖尿病患病率的提高亟须加强对于糖尿病及其合并症的适宜筛查、预防和治疗。

### 3.4 非糖尿病人群视网膜病变

根据 2003 年美国糖尿病协会推荐标准,即空腹血糖

7.0 mmol/L,或问卷中有明确的既往诊断糖尿病病史者,诊断为糖尿病。视网膜病变对眼底数码照片按照改良的糖尿病视网膜病变早期治疗研究(EIDRS)的读片标准进行。应用 Logistic 回归模型分析在非糖尿病人群中视网膜病变的相关因素。在所有非糖尿病人群中视网膜病变的总患病率为 13.6% (95% CI 12.6%-14.6%)。经与 2000 年全国人口普查农村人口进行年龄、性别的校正后,30 岁以上人群视网膜病变的患病率为 12.1% (95% CI 11.1%-12.9%)。在非糖尿病人群中视网膜病变的相关独立因素为年龄 (OR, 1.02; 95% CI 1.01-1.03 per year increase)、性别 (male vs female, OR, 1.27; 95% CI 1.08-1.49)、空腹血糖水平 (OR, 1.30; 95% CI 1.11-1.53 per mmol/L increase)、收缩压水平 (OR, 1.15; 95% CI 1.05-1.27 per 10 mmHg increase) 和舒张压水平 (OR, 1.16; 95% CI 1.09-1.22 per 10 mmHg increase)。本研究华人非糖尿病视网膜病变的患病率明显高于既往在白色人种的报道,如在 Beaver Dam 眼病研究<sup>[71]</sup>中为 7.8%,美国心血管健康研究 (the Cardiovascular Health Study, CHS)报道<sup>[67]</sup>为 8.3%,蓝山眼病研究为 9.8%,糖尿病预防研究<sup>[72-73]</sup> (the Diabetes Prevention Program Research Group, DPP)为 9.9%。总之,邯郸眼病研究结果显示我国农村成年人非糖尿病人群中的视网膜病变并非罕见,其患病率高于西方国家的报道,其发生与血糖、血压相关,提示在血糖水平的正常高限或血压的正常高限即可能存在视网膜早期的微血管改变,可能是由于以上危险因素以及个体易感性的共同作用所致的早期视网膜微血管损害的表现。关于非糖尿病人群中视网膜病变出现的临床意义尚需进一步的长期随访研究。

### 3.5 黄斑前膜<sup>[74]</sup>

根据眼底像和/或相干光断层成像 (optical coherence tomography, OCT) 对黄斑前膜进行诊断,根据眼底像将黄斑前膜分为两类:黄斑区玻璃纸样反光 (cellophane macular reflex, CMR) 和黄斑区视网膜前纤维增生 (preretinal macular fibrosis, PMF)。黄斑前膜的患病率为 3.4% (95% CI 2.9%-3.8%), 双眼患病率 20.3%, CMR 2.2%, PMF 0.7%, 无法分类 (仅能借助 OCT 诊断) 为 0.5%。男女患病率相近 (女性为 3.6%, 男性为 3.1%)。人群中黄斑前膜的患病率呈现随年龄增加而显著增高的趋势 ( $P$  for trend < 0.001)。继发性黄斑前膜在白内障手术后、视网膜静脉阻塞和糖尿病视网膜病变的患病率较高,分别为 24.0%、14.3% 和 7.9%。控制年龄和性别因素后,特

发性黄斑前膜与近视呈正相关 (OR: 1.58, 95% CI 1.12-2.23), 与现在吸烟呈负相关 (OR: 0.61, 95% CI 0.38-0.97, 与从不吸烟相比)。然而,对吸烟量和烟龄的进一步分析显示,黄斑前膜与现在吸烟的负相关并未得到证实。校正年龄、性别与晶状体混浊程度因素后,特发性黄斑前膜的最佳矫正视力明显低于未患黄斑前膜眼 (平均 LogMAR 视力降低 0.07, 95% CI 0.05-0.10)。本研究结果较北京眼病研究报告的患病率 (2.2%, 40 岁以上人群) 高<sup>[75]</sup>, 但是明显低于其他国家其他人种研究报告的患病率<sup>[76-79]</sup>。

### 3.6 成人正常眼黄斑区视网膜厚度测量<sup>[80]</sup>

应用 Stratus OCT 的快速黄斑厚度地形图扫描程序 (Fast Macular Thickness Map) 对黄斑区视网膜厚度进行测量。从该人群样本中,按照统一的入选与排除标准,选取正常眼进行分析,建立以人群为基础的国人正常眼活体黄斑视网膜厚度的定量测量数据,并对年龄、性别等对黄斑厚度的影响进行探讨。

选取正常人 2230 人 (占被检者的 32.7%, 平均年龄  $46.4 \pm 9.9$  岁, 58.4% 为女性)。测得黄斑中心凹最小厚度、中央区平均厚度及内、外环区平均厚度分别为  $150.3 \pm 18.1$ ,  $176.4 \pm 17.5$ ,  $255.3 \pm 14.9$ , 与  $(237.7 \pm 12.4) \mu\text{m}$ 。黄斑区形态呈现出中心凹处最薄,内环即 1~3 mm 直径处最厚,向周边即外环 3~6 mm 直径处又变薄的特点 (均为  $P < 0.0001$ )。在内环区鼻侧象限视网膜厚度较上、下象限薄;而在外环区鼻侧象限最厚 (均为  $P < 0.0001$ )。黄斑中心凹最小厚度、黄斑中央区平均厚度与年龄呈正相关 (系数分别为 0.495 与 0.368, 均为  $P < 0.001$ ), 男性的黄斑中心凹最小厚度、黄斑中央区平均厚度及内、外环区平均厚度均较女性厚。因此正常人眼黄斑中心凹最小厚度与中央区平均厚度分别较大多数其他人种低 11~32  $\mu\text{m}$  与 7~41  $\mu\text{m}$ , 随年龄增加而显著增厚。男性的黄斑中心凹最小厚度、中央区平均厚度、及内、外环区平均厚度均较女性厚。

## 4 小结

邯郸眼病研究是在我国北方农村地区进行的以人群为基础的横断面研究,其研究人群全部为占我国人口大多数的农村人群,特别纳入 30~39 岁人群以建立研究队列进行长期随访,达到了很高的应答率 (>90%),设立中央检查中心确保研究质量,并采用眼底数码照相、光学相干断层成像等较多的客观检查

设备以及国际诊断标准, 将为我国北方农村地区农村人群主要致盲眼病的流行病学研究提供更多数据。

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