WORLD HEALTH ORGANIZATION
ORGANISATION MONDIALE DE LA SANTÉ

WHO/PBL/82.7
ORIGINAL : ENGLISH
INDEXED
WHODOC 2/1

REPORT OF THE JOINT WHO/NEI INFORMAL WORKSHOP ON CATARACT EPIDEMIOLOGY
Bethesda, Maryland, 9 June 1982

National Eye Inst. (U.S.)

INTRODUCTION

An informal workshop on cataract epidemiology was held on 9 June 1982 at the National Eye Institute, Bethesda, Maryland, USA. The meeting was chaired by Dr Carl Kupfer, Director of the National Eye Institute (NEI), and Dr R. Milton acted as rapporteur. The participants, most of whom represented WHO Collaborating Centres for the Prevention of Blindness, are listed in Annex I.

Cataract is the leading cause of visual loss in the world, with an estimated total, at present, of 17 million people suffering from severe visual disability due to this disorder. The present strategy to combat blindness due to cataract is based on ocular surgery to restore sight, the disease not being preventable. In view of the rapidly increasing impact of cataract due to the generally increased life expectancy and aging of populations in developing countries, the possible prevention of cataract is gaining more attention. In this context, epidemiological studies are of particular importance, in order to assess possible risk factors in the formation of cataract.

This informal workshop, which was arranged following a recommendation by the WHO Programme Advisory Group on the Prevention of Blindness at its Fourth Annual Meeting in 1982, focused on the planning of studies related to the epidemiology of cataract (see Agenda, Annex II). This meeting also provided an opportunity for the exchange of information and to coordinate activities among those WHO Collaborating Centres for Prevention of Blindness presently undertaking or planning investigations in the field of cataract epidemiology.

The format of this meeting and the limited time available did not allow for discussion of the important field of eye health services' research for the management of cataract. This aspect has, however, been dealt with in a previous meeting (Hyderabad, 1980) and reference is made to the document SEA.3.

1. REVIEW OF AVAILABLE EPIDEMIOLOGICAL DATA

Data on the magnitude of the cataract problem come mainly from three sources : blindness registries, prevalence surveys, and reports on the number of operations performed. These data indicate that cataract is the leading worldwide cause of blindness. Many reports indicate that the distribution of cataract and its resultant blindness varies widely, being especially common in developing countries located in the tropical belt. This is of special concern because cataract prevalence increases rapidly with age, and it is estimated that the number of persons in developing countries aged 55 years and over is expected to increase five-fold by the year 2025.

There have been relatively few epidemiological studies of senile cataract - the most frequently occurring type of cataract - but associations with several risk factors have been reported, including diabetes, exposure to infra-red, ionizing, ultra-violet, and microwave radiation, inadequate nutrition, family history of cataract, myopia, various drug exposures, and a variety of biochemical factors. Females appear to be at a somewhat increased risk. Further analytical studies are needed to determine the role of the various genetic and environmental factors in cataract etiology.

2. IDENTIFICATION OF RISK FACTORS

In designing potentially feasible and fruitful epidemiological studies of senile cataract as a blinding disease of global significance, two important factors need to be considered.

Firstly, there are many potential risk factors that have been associated with the presence of senile cataract. Although the strength of this association (or relative risk) may be strong, the contribution of these factors, for example galactosemia or diabetes, to the overall prevalence of cataract (attributable risk) may be small because of the small number of people affected by that particular factor.

The second important point is the tremendous difference in the frequency of cataract in different geographical areas; for example, cataract is about three times more common in north-western India than in the USA.

In dealing with the epidemiology of blinding cataract as a global problem, attention should be directed to the factor(s), or the interplay of those factors which are responsible for the tremendous increase in the frequency of cataract in the developing areas. Of all the potential risk factors, the two most likely to play a significant role are thought to be environmental exposure to sunlight (and to UV radiation in particular), and the effect of nutrition, especially protein intake. Initially at least, these questions are best answered by carefully designed cross-sectional field studies. These studies should use the simplest possible technology for the field examination while using the most rigorous design and analytical procedures.

3. CLASSIFICATION OF CATARACT

The classification of cataract or lens opacities is an essential component of the definition of cataract. Lack of comparability of definitions of cataract contributes to the difficulty in evaluating results of cataract epidemiology studies. Classification schemes presently used explicitly or implicitly involve some or all of the following elements : opacity size, colour, location and density; observation by photographic, slit lamp, and direct ophthalmoscopic methods; examination through dilated or undilated pupils; visual acuity deficit accompanying or caused by lens opacities. It is recognized that laboratory, clinical, hospital, and field conditions generally permit different degrees of complexity, rigour, and completeness in the application of examination and classification methods. The structure of a generally useful classification scheme would permit the breakdown of detailed, multi-category levels (as in laboratory research) into simpler, two- or three-category levels that are operationally feasible in the field.

4. BIOCHEMICAL ASPECTS OF CATARACT EPIDEMIOLOGY

In vitro human lenses and experimental cataracts from animal models are convenient for biochemical research. The transfer and translation of knowledge from such research into promising epidemiological hypotheses and investigations is a major challenge. Suggestions for use in epidemiological studies may come from *in vitro* biochemical comparisons of lenses from geographically distinct populations, or of small, early lens opacities with late, mature cataracts. Plasma and enzyme profiles of persons with and without cataract in a homogeneous population with careful nutritional history would be a significant biochemical contribution in the epidemiology of cataract.

5. RESEARCH DESIGNS FOR CATARACT RESEARCH

Three areas of study are important in cataract research. Firstly, one may wish to examine the relation of biological risk factors (e.g. dietary practices, family history, serum biochemistry, environmental exposures) to prevention and retardation of cataract. Secondly, one may examine the effect of sociological risk factors on the utilisation of medical care or cataract surgery. These factors may include a person's role in the family (e.g. breadwinner, grandparent), type of work and importance of vision, income, and attitudes towards health, vision problems, and hospitalization. KAP (knowledge, attitudes, practice) inventories toward surgery are appropriate for consideration. Thirdly, lens biochemistry may be examined according to such factors as location of opacity, degree of opacity, and age of patient in relation to prevention and retardation of cataract.

Research strategies available include : (a) sampling by factor (or agent), then study of disease; (b) sampling by disease (opacities or surgery), then study of the factors; and (c) sampling by person, then study of factors and disease. Strategy (b) is known as the case-control method.

Examples of strategy (a) might be selecting fishermen and miners, and comparing rates of disease; or selecting villages at high and low altitudes, and comparing rates of disease. An example of strategy (b) might be to find young persons with advanced cataracts and young persons with clear lenses, and to study dietary habits, presence of disease in siblings, biochemistry, etc. An example of strategy (c) could be to survey the residents of a village and determine the lens status of each person (or of a sample of persons), and to study risk factors as suggested above.

The case-control method, while very useful, is not a panacea, and there is room for various strategies. Other methods to be considered include migrant studies, twin studies, and longitudinal studies. Collaborative studies in various parts of the world using exactly the same research protocol would be desirable.

CONCLUSIONS AND RECOMMENDATIONS

This informal meeting focused on the epidemiology of cataract viewed from the perspective of etiological studies. It is not intended to divert interest from the equally important areas of health services' research, sociological and behavioural studies, or studies dealing with the impact of cataract blindness on individuals and their communities.

1. There is a great need to collect more information on cataract and its impact in terms of loss of vision in different areas and populations. Well planned field surveys should be undertaken to this effect, to allow for subsequent epidemiological analyses.

2. Priority should be given to research on risk factors of large magnitude and those ultimately leading to blindness from cataract.

3. A classification system, supported by a series of photographic standards, should be developed and tested. Such a classification should be sufficiently flexible to accommodate different research settings, including drug trials.

4. A uniform terminology, to be used in the definition of lens opacities, should be developed.

5. The definition of lens opacities and the recording of visual acuity should be included in epidemiological studies on cataract.

6. Measurement techniques of exposure to environmental risk factors should be included in epidemiological studies on cataract.

7. The biochemical data appropriate for inclusion in epidemiological studies on cataract should be defined.

8. Collaborative studies, utilizing common protocols, should be promoted, particularly between WHO Collaborating Centres for the Prevention of Blindness and affiliated institutions.

9. The preparation of an atlas or similar document on cataract and loss of vision should be considered in the future, when more reliable data on the epidemiology of the disease may become available.

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AGENDA OF THE MEETING

Opening of the Meeting

Introduction and Purpose of the Meeting

1. Review of available epidemiological data (Dr R. Sperduto)
2. Identifications of risk factors - hypotheses to be tested (Dr H. Taylor)
3. Classification of cataract (Dr L. Chylack)
4. Biochemical aspects of cataract epidemiology (Dr V. Reddy)
5. Study design considerations (Dr D. Seigel)
6. Priority areas of research

Conclusions and Recommendations

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