

55. Doctors with inherited colour vision deficiency:
their difficulties in clinical work

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Abstract

The range of difficulties in clinical practice of doctors - mainly GPs - with inherited colour vision deficiency was determined by questionnaire and related to results of colour vision testing for type and severity. Many difficulties were found, more amongst those with moderate or severe defects, and doctors' attitudes to their own colour deficiencies varied. Vocational screening and counselling for prospective doctors should be considered.

Introduction

Studies relating the clinical skills of doctors to the results of tests of colour discrimination are rare (Voke, 1980; Vakil *et al*, 1991; Rigby *et al*, 1991; Koningsberger *et al*, 1994) and only three doctors seem to have published articles on their own difficulties in clinical work due to their inherited defect of colour vision (Logan, 1977; Spalding, 1992; Currier, 1994). Colour plays a part in many observations in medicine, however, and colour deficiencies are not uncommon. There have been no studies of its prevalence among doctors but such information as there is suggests that about 2000 general practitioners and 3000 hospital doctors practising in the UK in 1992 had a colour vision defect (Voke, 1980; Rigby *et al*, 1991; Koningsberger *et al*, 1994; MacLean, personal communication). Medical students in most countries are not screened for colour deficiencies. School-children in the UK are screened but not tested for severity.

This study aimed to discover the range of difficulties of general practitioners and to relate these to the type and severity of their defect. General practitioners have many ways to compensate for their defect, but certain features of their work may still be adversely affected.

Materials and methods

Doctors completed a questionnaire in response to letters in medical journals. They were given a battery of colour vision tests either in university departments - mainly of optometry and visual science - or by being visited. They were told the results of their tests and counselled.

The tests and numbers taking them were: Ishihara (39), City University (33), Farnsworth D15 (22), Farnsworth-Munsell 100-hue (22), Nagel Anomaloscope (18); Pickford-Nicholson Anomaloscope (2), American Optical HRR (6).

The word 'difficulty' in the questionnaire was intended to have its dictionary meaning, but because one doctor was uncertain of this, it was clarified in the last 15 questionnaires in the following way: 'A difficulty is any problem believed to be caused by the defect whether or not it is overcome'.

Results and discussion

Of the 42 doctors who completed the questionnaire, 40 were tested. The sample comprised 38 males and 2 females, with a mean age of 48.3 years; all but five were general practitioners; nine were retired.

Some verbatim answers

(D = deuteranope (dichromat); P = protanope (dichromat); DA = deuteranomalous trichromat; PA = protanomalous trichromat)

DA (moderate) Difficulties are overcome by awareness, self-training and effort. Nevertheless, red/green blind doctors would be better advised to avoid careers in haematology, histology and bacteriology.

DA (severe) I was aware of my colour blindness before going to medical school, but I only just realised (after being qualified 6 years) why I was useless at certain things, e.g. histology, clinical examination. My loss of confidence might have been sympathetically handled by medical school staff had they been on the lookout for this problem.

D (i.e. severe) Nowadays I am a trainer for young physicians in vocational training and advertise my own handicap in order to teach the young people to do the same, and then we consciously develop methods to overcome the problem.

D (i.e. severe) I did a year in pathology and had not realised that stains showed different tissue - no one had told me. My eyes pick up very fine detailed physical features of rashes etc. I feel this and body language are major advantages I have developed. I frequently ask my colleagues for advice, especially over babies with rashes and fevers etc. and the chance of a red ear or throat. I feel very vulnerable at the end of a busy surgery. I believe there are times when patients describe red rashes and I cannot see them and nurses point to the invisible dots.

I cannot believe that I could be guided to two careers which depended heavily on colour, e.g. pathology and dermatology. The profession offers no guidance and I feel vulnerable at times.

P (i.e. severe) In my ophthalmological training I will probably choose a sub-speciality that does not concentrate on fundal examination, e.g. oculoplastics, strabismus, etc., as opposed to medical retina, vitreo-retinal surgery.

DA (severe) I once diagnosed a haematemesis as bile. The patient was lucky to survive. I once very nearly missed a haemorrhage into the anterior chamber in an Indian boy - but eventually saw the line of the blood-fluid level.

DA (moderate) I worry about missing the so-called pink ear.

DA (moderate) [For pallor]. In bedside work assessment by skin and conjunctival colour is not so easy as for the normal.

DA (moderate) I believe I am a safer anaesthetist because I insist on the appropriate monitors, especially pulse oximetry which can detect a drop in oxygen rather earlier than any non-colour-blind clinician.

Results of colour vision tests

All doctors had previously received a screening test (Table 1). One doctor first learnt that he had a defect (moderate) 6 years after qualification. Only 6 could state whether they were protan or deutan.

There were 33 deutans (6 slight, 10 moderate and 17 severe, of which 13 were dichromats) and 7 protans (1 slight, 1 moderate and 5 severe, of which 4 were dichromats).

What difficulties and advantages did you have in everyday life?

For difficulties, 28 mentioned dress sense, 15 decor, 13 traffic lights and signals. Others mentioned included sport, navigation, aesthetic sense and maps. Those with moderate and severe defects tended to report more difficulties. For advantages, 26 reported none, 5 the detection of camouflage and 4 enhanced perception in ways not involving colour.

A comparison can be made with the rather similar findings of Steward and Cole (1989) and Cole and Steward (1996).

The protan/deutan ratio is about the same as for the general population but the number of dichromats is higher. For anomalous trichromats the proportions of mild, moderate, and severe gradings is not known for the general population.

What difficulties did you have in medical practice and as a student?

A total of 197 difficulties due to colour vision defects was reported (Table 2).

Table 1. Colour vision tests performed and doctors' knowledge of their own defect prior to this study.

Screening test. Other tests done	Ishihara, 38; Coloured wool, 1; Lantern 1 D15, 2; 100-Hue, 3; City University, 2; Anomaloscope, 2; Bacon, 1
Tests performed by:	School medical service: 18; At college: 11; Others: 11
Advice reported to be given on screening	None: 27; About professions: 12; Misinformed: 1
Knowledge of: Severity: Type:	Unknown or incorrect, 28 Partly known (i.e. red/green): 30
Doctors who learned late that they had a defect	6 years after qualification: 1 Within 2 years following qualifications: 2

The verbatim answers given earlier help in appreciating the significance of these results. Doctors were aided by the following headings in the questionnaire: Paediatrics, General Medicine, Surgery, Dermatology, Infectious Diseases, Otoscopy, Ophthalmology, Mouth and Throat, Reading Test Results (e.g. test-tapes), and Charts.

If you have difficulties in medical practice how do you overcome them?

Seventeen answered that they did so by close observation or cross-checking: they specified looking, touching, doing special investigations and attention to lighting; seven asked for help from others; four gave more attention to the history. One reported that the rash of scarlet fever felt like sandpaper and that he felt for the rash of typhus. Some reported that when reading test tapes they relied on 'shade' or 'tone' rather than colour and only one reported using a meter.

Difficulties in medical practice and as a student related to severity and type of defect.

There appeared to be no difference between moderate and severe defects for numbers of difficulties reported. Some doctors with moderate or severe defects reported no or few difficulties and make a striking contrast to those who reported many difficulties. One doctor with a mild defect reported as many as eight difficulties, but a further interview with him suggested that he was misinterpreting the cause of some difficulties. No differences were shown between protans and deutans for type or number of difficulties.

Table 2. Difficulties reported in medical practice and as students.

Subject	<i>n</i>
Widespread body colour changes: pallor (12), cyanosis (9), jaundice (3), cherry-red (2)	26
Dermatology/rashes/erythema of skin (6)	25
Charts (13), slides (5), prints (2), codes (4)	24
Test-strips for blood and urine	22
Ophthalmology: disc pallor (3), diabetic changes (2), haemorrhage versus pigment (1), glaucoma (1), haemorrhage in anterior chamber (1), Kayser-Fleischer rings (1), others (9)	18
Body products: blood or bile in urine, faeces, sputum, vomit	18
Otoscopy: the inflamed drum (8), wax versus blood (1), others (5)	14
Microscopy (students: 11)	13
Mouth and throat conditions	9
Ishihara test giving	8
Chemistry end-points (students)	7
Colour naming	5
Tissue identification (surgery: 3)	4
What am I missing?	3

Table 3. Significance given to difficulties related to their number, and to type and severity of defect.

Response	Mean no. of difficulties	Severity			Type of defect	
		Slight	Moderate	Severe	Deutan	Protan
No or very little significance	2.1	5	6	2	11	2
Some significance	6.8	0	4	11	11	4
Major significance	9.5	1	2	5	7	1
No difficulties	0.0	1	0	3	4	0

Do you think your defect has given you any advantages in medicine?

Twenty-six answered no; five thought that it enhance their ability in other types of observation; three felt that they were able to observe jaundice at an earlier stage than other doctors and one had confirmed this by bilirubin blood levels. If reliable this may be a new finding.

The significance doctors gave to difficulties related to colour vision defects

The majority thought that overall they were functioning effectively. Some thought their defect of little or no significance, particularly those with a mild defect, and others that it was of some significance but did not cause a major problem. Eight doctors thought the defect was of major significance by virtue of the fact that they believed that they should not practise in certain specialities, or, in the case of one doctor, because he thought he had put a patient's life at risk due to his defect, which resulted in him concluding that bile rather than blood was present in vomit. The specialities mentioned were: histology, haematology, bacteriology, surgery, pathology, dermatology, anaesthetics and retinal work in ophthalmology. They may or may not have been correct in coming to these conclusions, but the fact that they did indicates that they took their response seriously. However, no doctor stated that he or she should not be working in general practice. The 11 doctors with moderate or severe defects who noticed no difficulties or gave them no or little significance may have been failing to notice observational errors.

The results of this study point towards the need for pre-vocational screening for colour vision deficiency and counselling about its implications in the medical profession.

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