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Validity of self reported male balding patterns in epidemiological studies

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Abstract

Background

Several studies have investigated the association between male pattern baldness and disease such as prostate cancer and cardiovascular disease. Limitations in the lack of standardized instruments to measure male pattern baldness have resulted in researchers measuring balding patterns in a variety of ways. This paper examines the accuracy and reliability of assessment of balding patterns by both trained observers and men themselves, using the Hamilton-Norwood classification system.

Methods

An observational study was carried out in Western Australia with 105 male volunteers aged between 30 and 70 years. Participants completed a short questionnaire and selected a picture that best represented their balding pattern. Two trained data collectors also inde participant's balding pattern using the same system and the men's self with the trained observer's assessment. In a substudy, observers asses a photo of the man aged 35 years while the man independently rated hi

Results

Observers were very reliable in their assessment of balding pattern (85%
0.83). Compared to trained observers, men were moderately accurate in
their balding status (48–55% exact agreement, κ = 0.39–0.46). For the s
agreement between the men and the observers was 67% and the agree
groups was 87%.

Conclusions

We recommend that male balding patterns be assessed by trained persc
Norwood classification system. Where the use of trained personnel is no
assessment both currently and retrospectively has been shown to be ac

Background

Male pattern baldness is the most common form of baldness observed in
two main types of balding are: frontal balding in which the hair recedes b
forehead region backwards; and vertex balding in which a bald spot app
the head. Total balding may be due to continued spread of frontal baldin
frontal recession and vertex balding[1,2]. Whilst human hair growth is af
factors, androgens are the most obvious regulators of normal hair growt
for male pattern baldness[1]. Serum levels of total and free testosterone
globulin, and dihydrotestosterone may be important especially given the
between free testosterone level and baldness[3].

Several studies have been conducted investigating the association betw
baldness (as a proxy for testosterone levels) and various health issues s
[3-7] and cardiovascular disease[6,8,9]. Different methods have been us
baldness in these studies, including the Hamilton-Norwood classification
undertaken in order to determine the accuracy and reliability of assessm
both trained observers and men themselves, using the Hamilton-Norwoc

Methods

Subjects were male volunteers between the ages of 30–70 years recruit
shopping centres, universities, the central business district and other pu
metropolitan area of Perth, the capital city of the state of Western Austra
August 2003. Of the 105 volunteers recruited, two were less than 30 ye
were ineligible for the study.

Participants completed a questionnaire providing minimal information reg
characteristics, including age, ethnicity, and level of education. Included
an unlabelled Hamilton-Norwood classification scale[2] (Figure 1), which
examine and to select the picture they believed best depicted their own

Figure 1. Hamilton Norwood Classification Scale (OT No

Whilst the subjects completed the questionnaire, two data collectors wit
recognising different balding patterns independently assessed the partic
using the same classification system. On recruitment, participants were
with medical research, however the role of the data collectors with regar
assessment of the participant's balding pattern was not revealed until a
complete.

Where possible, (sporting clubs and universities) volunteers were asked
themselves at age 35 on the day on which the study would be done. Th
by the observers to independently assess the men's balding patterns at

participants completed the questionnaire. These participants were also a
from the Hamilton-Norwood scale which best depicted their balding patt
not permitted to look at the photographs while completing the questionr

For data analysis, we compared the assessments of the two observers v
assessment of the participants with the assessments of the observers. I
reference pictures included in the Hamilton-Norwood classification syster
separately and the percentage of cases with exact agreement on these
each of the observers and the subjects, and between the two observers
then arranged into four groups according to overall balding pattern: no b
1); vertex balding only (C); combination of frontal and vertex balding (D
only (I to L). Percent agreement within group was then calculated for ea
subjects and between the two observers. The percent of agreement was
groups (younger than 50 years, and 50 years or older); self-reported eth
other); and education. Where possible, kappa statistics were also calcul

Results

There were 69 participants (67%) between the ages 30–49 years, and 3
the ages 50–70 years. Whilst 70% of subjects considered themselves of
(Caucasian born in Australia), the remainder was made up of representa
(20.4%), Asia (4.9%), New Zealand (3.9%) and South America (1%). A t
education or equivalent (30.1%); 22.3% had completed high school but
education; 12.6% had completed junior high school only; and, because o
universities, 19.4% of subjects had an undergraduate degree and a furth
post-graduate study.

Overall, trained observers were found to be highly reliable at analysing h
exact agreement of 85.4% and an agreement within balding pattern gro
Compared to the observers, men were found to be moderately accurate
their current balding pattern with an exact agreement percentage rangir
agreement as to balding group around 70%.

Table 1. Reliability and validity of assessment of balding patterns

In regards to how different demographic characteristics affect men's abil
pattern (Table 2), the characteristic with the most influence appeared to
50 or above being more accurate (exact agreement 56–62%) than men
(exact agreement 45–52%). Men who finished high school were the mos
their balding status followed by either those that had studied at technica
The least accurate were men who had completed year 10 at high school
had completed post-graduate studies also performing fairly poorly. The e
to assess balding patterns (between Australian and non-Australian men
significance.

Table 2. Validity of assessment of balding group by age, ethnicity and edu

There were 15 subjects who provided photos of themselves aged approx
both observers examined 13 of these. The inter-observer reliability for e
= 0.766, $p < 0.001$) and agreement within balding pattern groups increa
0.001). Observer 2 only examined 13 subject, so for the 15 subjects exa
agreement between the men and the observer was 66.7% for exact mat
agreement within the balding pattern groups.

Discussion

In this study we have shown that trained observers are very reliable in a
patterns. Our data also show that, when compared to the trained observ
assess their balding patterns quite well. In particular, men are accurate
pattern group they have. This result is important due to previous resear
overall pattern of hair loss rather than extent of balding that determines
increased risk of developing negative health outcomes including prostate

There have been several studies investigating the link between male pa
prostate cancer[3-5,7,10], as well as other health issues such as cardiov
these studies, balding patterns have been assessed using different tech
complex than others. There has been controversy over the use of some c
methods of assessment[6], as little research has been performed regard
their ability to discriminate between the types of balding (vertex, frontal,
vertex and frontal). In a study performed by Hererra *et al*[11] assessmer
pattern involved counting the total number of bald spots found on the h
assessment performed six years later on the same subjects, there was a
of baldness in 12% of study participants. This apparent reversal of baldi
attributed to regrowth from treatment or other means, and so it must be
methods used to assess baldness in these participants were unreliable.

Other methods for assessing baldness have been used in clinical situatio
grids used with standardized photographs of the scalp or in vivo[12]; an
and macrophotographic[14] techniques in which the individual hairs are
techniques may be used in well-funded clinical trials with the aim of asse
they are not appropriate for epidemiological studies in which often the o
classify men as to their type of balding.

The majority of studies[4,7,10,15] have used variations on the Hamilton
Norwood in 1975[2]. This method allows for the grading of baldness in te
pattern. The scale can be used either by independent observers, or by m
official instructions for use or training manuals are available. No previous
performed to assess the accuracy and reliability of either trained indepe
participants themselves in the assessment of balding patterns.

The strengths of our study included the recruitment of volunteers from a
population thus allowing for extrapolation of the results back to the wide
research was performed as an observational study, care was taken to av
influencing the results. This included not informing participants that the
assessing their balding pattern until after the questionnaire was comple
also refrained from giving advice to participants when asked to help asse

Older subjects appeared to be better at assessing their balding group th
years. This may be due to greater hair loss resulting in a more straightfo
balding patterns, or possibly just a greater self-awareness of degree of
the older age group. The results with regard to education were confusin
senior high school education seeming to be best at assessing their baldi
have just been due to small numbers in the groups. Other demographic
included in our questionnaire may have been of interest in determining fa
accuracy of men's self assessment of their balding pattern. These include
status, occupation, and personality sub-types, and we would encourage
the area to investigate the possible relationship between these aspects
self-assessment.

Any extrapolation of our data needs to take into account the differing me
between our study and other studies in which the man may obtain advic
in the home environment, as well as have access to mirrors and photogr
assessment of current and past balding patterns. These factors do not n

results however, as the use of such help would ultimately increase accur from the already acceptable level shown in our results, rather than detra

The study of the accuracy of previous balding was limited by small sampl be approached prior to the study to provide a photograph of them at age numbers of eligible participants, and also meant that the men may have themselves before completing the questionnaire, which may have increas retrospective assessment. Difficulties in assessing vertex balding from th observer also became apparent, as often photographs did not provide a top and back section of a participant's head. It is unlikely that these limit as it would be difficult to devise another method for the observer to retr participant's balding pattern at age 35.

Previous research has demonstrated an intra-observer rate of consisten 99% using the Hamilton-Norwood scale[2,10]. Hamilton himself classifie then repeated the process three months later without reference to the o but one of the classifications were identical. The scale was modified in 19 Hamilton scale has been found to correlate with local hair density[14]. A of balding patterns was recently been described for use in hair restorati scale has not been used in the epidemiological context.

Conclusions

From this study, we suggest that any further work requiring assessment consider the use of trained observers as the gold standard of assessmer unattainable, we have shown that men's self evaluation is accurate enou and validity of results. In addition, we believe this study demonstrates th between male balding patterns and health effects, that men can reliably balding pattern and assess their own risk.

Competing interests

The author(s) declare that they have no competing interests.

Authors contributions

RT and JM planned the study, collected the data, analysed the data unde the study report for a student project.

JL assisted in planning the study and drafted the manuscript

LF assisted in planning the study, supervised data collection and analysi manuscript.

All authors read and approved the final manuscript

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