A study of the relation between body mass index and the incidence of age related macular degeneration

H A Moeini, H Masoudpour, H Ghanbari

Background: Age related macular degeneration (ARMD) is the most frequent cause of blindness among the elderly. Obesity may be one of the risk factors of ARMD as suggested, yet not proved, by several studies. This study assesses the relation between body mass index (BMI) and the incidence of ARMD.

Methods: This case-control study included 50 patients with ARMD and 80 subjects who were adjusted for age, sex, cigarette smoking, blood pressure, and diabetes. Data analysis was performed by SPSS V9.0 using Student’s t and χ² tests.

Results: 42% of the subjects in the case group and 35% of those in the control group were men. Mean age of subjects in the case and control groups was 69.9 years (62–77 years) and 64.08 years (56–71 years), respectively. Mean BMI measured 25.38 (range 21–29) and 30.24 (26–34) in the case and control groups, respectively (p>0.05). 12% of subjects in the case group were obese, 42% were overweight, and 45% were lean. 22.5% of subjects in the control group were obese, 45% were overweight, and 7.5% were lean (p<0.05).

Conclusion: 43% of patients in this study were aged 70 years or older, which is similar to other studies. There was no significant difference in BMI between the case and control groups. Recent studies indicate that obesity is a probable risk factor for progression of ARMD, but there is no significant relation with the presence of ARMD. With multivariable analysis, the authors could identify no significant relation between the presence of ARMD and the studied risk factors.

Age related macular degeneration (ARMD) is a degenerative disease of the macula and the leading cause of blindness and visual impairment among people aged 50 years or older in the United States and other developed countries throughout the world.

Abbreviations: ARMD, age related macular degeneration; BMI, body mass index; SD, standard deviation.

RESULTS

A total of 42% of subjects in the case group were male and 58% were female. Table 1 represents a comparison of demographic characteristics and ARMD risk factors between the two groups. In this study, there was no significant difference between the two group regarding history of smoking and duration of hypertension and/or diabetes.

Mean (SD) of BMI in the case and control groups measured 25.38 (3.85) and 30.24 (28.55), respectively.

Abbreviations: ARMD, age related macular degeneration; BMI, body mass index.
Individuals also seemed to be at risk. Mean (SD) of BMI in obesity was considered a risk factor for ARMD, yet lean overweight, and obese individuals, respectively. In this study, ARMD development measured 1.43, 1.24, and 2.15 for lean, BMI and development of ARMD; however, risk ratio for neovascular ARMD showed a significant association between

Studies were overweight and 12% were obese. Similarly, 45% of countries. As gauged by BMI, 42% of the cases in this study were overweight and 12% were obese. Similarly, 45% of control subjects were overweight and 22.5% were obese. A study by Schaumberg et al of 256 cases of dry and 84 cases of neovascular ARMD showed a significant association between BMI and development of ARMD; however, risk ratio for ARMD development measured 1.43, 1.24, and 2.15 for lean, overweight, and obese individuals, respectively. In this study, obesity was considered a risk factor for ARMD, yet lean individuals also seemed to be at risk. Mean (SD) of BMI in the case and control groups in this study measured 25.38 (3.85) and 30.24 (2.85), respectively, showing no significant difference between the two groups.

Multifactorial analysis showed that neither of the studied risk factors was a predictor of ARMD development.

**DISCUSSION**

Age-related macular degeneration is the leading cause of visual impairment in people 50 years or over in developed countries. As gauged by BMI, 42% of the cases in this study were overweight and 12% were obese. Similarly, 45% of control subjects were overweight and 22.5% were obese. A study by Schaumberg et al of 256 cases of dry and 84 cases of neovascular ARMD showed a significant association between BMI and development of ARMD; however, risk ratio for ARMD development measured 1.43, 1.24, and 2.15 for lean, overweight, and obese individuals, respectively. In this study, obesity was considered a risk factor for ARMD, yet lean individuals also seemed to be at risk. Mean (SD) of BMI in the case and control groups in this study measured 25.38 (3.85) and 30.24 (2.85), respectively, showing no significant difference between the two groups.

**Table 1** Comparison of demographic factors and ARMD risk factors in the case and control groups

<table>
<thead>
<tr>
<th>Case (n = 50)</th>
<th>Control (n = 80)</th>
<th>p Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sex</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>21 (42%)</td>
<td>28 (35%)</td>
</tr>
<tr>
<td>Female</td>
<td>29 (58%)</td>
<td>52 (65%)</td>
</tr>
<tr>
<td>Mean age (SD)</td>
<td>69.9 (7.32)</td>
<td>64.08 (7.6)</td>
</tr>
<tr>
<td>Diabetes</td>
<td>10 (20%)</td>
<td>13 (16.2%)</td>
</tr>
<tr>
<td>Hypertension</td>
<td>23 (46%)</td>
<td>34 (42.5%)</td>
</tr>
<tr>
<td>Smoking</td>
<td>10 (20%)</td>
<td>12 (15%)</td>
</tr>
<tr>
<td>Mean blood pressure</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Systole (mm Hg) (SD)</td>
<td>143.3 (31.8)</td>
<td>150.5 (26.4)</td>
</tr>
<tr>
<td>Diastole (mm Hg) (SD)</td>
<td>83.2 (15.1)</td>
<td>84.03 (14.1)</td>
</tr>
</tbody>
</table>

NS, not significant.

**Table 2** Comparison of body mass index (BMI) in case and control groups

<table>
<thead>
<tr>
<th>Case n = 50 (%)</th>
<th>Control n = 80 (%)</th>
<th>p Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lean BMI &lt;20</td>
<td>7 (14)</td>
<td>6 (7.5)</td>
</tr>
<tr>
<td>Normal 20 ≤ BMI &lt;25</td>
<td>16 (32)</td>
<td>20 (25)</td>
</tr>
<tr>
<td>Overweight 25 ≤ BMI &lt;30</td>
<td>21 (42)</td>
<td>36 (45)</td>
</tr>
<tr>
<td>Obese BMI ≥30</td>
<td>6 (12)</td>
<td>18 (22.5)</td>
</tr>
</tbody>
</table>

NS, not significant.

(p<0.05). Table 2 shows a comparison of BMI in case and control subjects.

Mean (SD) of height, weight, and BMI measured 157.67 (8.76) cm, 63.20 (11.17) kg, and 25.39 (3.58), respectively, in the case group, and 154.61 (12.07) cm, 67.03 (17.29) kg, and 30.24 (2.85), respectively, in the control group (p<0.05). In this study, mean (SD) of right intraocular pressure measured 15.24 (3.71) mm Hg (10 mm Hg–32 mm Hg) in the case group and 17.14 (3.33) mm Hg in the control group (p<0.05). In this study, mean (SD) of right intraocular pressure measured 15.24 (3.71) mm Hg and 17.95 (6.36) mm Hg, respectively, showing a significant difference between the two groups.

Recent studies of patients with open angle acute glaucoma have highlighted BMI as an independent and significant risk factor for increased intraocular blood pressure. Studies of the association of BMI and intraocular pressure have yielded results consistent with these finding.

These findings did not implicate BMI in the development of ARMD. Mean (SD) of age in the case group was 69.9 (7.32) years. In similar studies, ARMD patients had a mean age of 66 years, within a range of 43–99 years. In this study, BMI in the control group was higher than that in the case group. Other risk factors may have a more prominent role in the development of ARMD. There are inconsistent results regarding the protective effect of antioxidants on the incidence of ARMD. Some studies have proposed that factors such as age, tobacco smoking, heredity, sex, high blood pressure and other cardiovascular risk factors, iris colour, age menopause, hormone replacement therapy, diet, and oxidative damage may be effective in the development and progression of ARMD.

Nevertheless, opinions are divided and further multicentric studies are warranted to better understand the role of each of these factors.

ARMD is known to be of multifactorial aetiology and obesity does not seem to be directly involved in its pathophysiology, however, since obesity has been related to many of the complications associated with old age, preventing it may lessen the effect of other ARMD risk factors.

**Authors’ affiliations**

H A Moeini, H Masoudpour, H Ghanbari, Feiz Hospital, Ophthalmology Department, Isfahan University of Medical Sciences, Isfahan, Islamic Republic of Iran

Correspondence to: Dr Hassan Masoudpour, No 12, Jomhori Square, Dr Masoudpour Alley, Isfahan, Islamic Republic of Iran; masoudpour@yahoo.com

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