


The Relationship Of Increasing Bmi On The Risk Of Cataracts

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Article Info	ABSTRACT
Keywords: Increased BMI, Cataract	Cataract is a disorder of the eye where the pathological condition of the lens becomes cloudy due to hydration of lens fluid or denaturation of lens proteins, so that the view looks like it is covered in fog. This study aims to identify the relationship between increasing BMI and the risk of cataracts. The research was carried out by collecting secondary data from various research journal sources for 2018-2024. The research results show that changes in the eye lens can be influenced by body mass index. The body mass index that has a high influence on the occurrence of cataracts is obesity. The occurrence of cataracts in obesity is influenced by increased oxidative stress due to high leptin levels. Prevention that can be done to reduce the risk of clouding of the lens is by following a healthy diet and taking vitamin supplements. Another thing people can do is control their weight while maintaining a normal body mass index (18.5–25.0kg/m ²).
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INTRODUCTION

Visual impairment and blindness are health problems that often occur in society. Blindness due to cataracts or clouding of the eye lens is a health problem that must be treated immediately. Blindness can cause disruption or reduction in the quality of human resources and loss of productivity. Blindness also requires quite large costs for treatment.

Cataracts are a condition where the lens of the eye which is usually clear and clear becomes cloudy. Cataracts are caused by a process of degeneration of the lens material which generally occurs in old age and is progressive, but cataracts can also occur due to congenital abnormalities, or chronic local eye complications. Due to the high number of cataract cases throughout the world with a very high prevalence of blindness, other causes of cataracts include family history, other eye diseases (glaucoma and uveitis), systemic diseases, regular use of eye drops containing steroids, smoking habits, and exposure to ultraviolet light.

In Indonesia alone, the rate of blindness due to cataracts is still very high. This is due to the increase in the number of people over 65 years and changes in lifestyle which causes an increase in the risk of cataract sufferers. These lifestyle and diseases include diabetes mellitus, hypertension, cholesterolemia, sun exposure, smoking, history of eye trauma, use of steroids and alcohol.

One of the factors that influences lens cloudiness is body mass index (BMI). BMI is a

standard measurement of body weight in kilograms divided by height in meters squared, this can influence the development of cataracts through several mechanisms.³ Based on 2018 Riskesdas data, it shows a figure of 21.8 percent for obesity sufferers in Indonesia. This figure has continued to increase since the 2007 Riskesdas, which was 10.5 percent and 14.8 percent in the 2013 Riskesdas. Apart from that, the prevalence of excess body weight also increased, recorded in 2018 by 13.6 percent. According to the World Health Organization (WHO), a BMI greater than or equal to 25 kg/m² is overweight, a BMI greater than or equal to 30 kg/m² is obesity, and a BMI less than 18.5 kg/m² is underweight.⁵

METHOD

This qualitative study aims to explore the relationship between increasing Body Mass Index (BMI) and the risk of developing cataracts. Data will be collected through in-depth interviews with individuals diagnosed with cataracts, as well as with healthcare professionals specializing in ophthalmology. The participants will be selected using purposive sampling to ensure a diverse representation of experiences and perspectives. The interviews will focus on participants' health histories, lifestyle factors, and their understanding of how BMI might influence their eye health. Additionally, field notes and observational data will be gathered during clinic visits to capture the contextual factors affecting the participants' health.

The data will be analyzed using thematic analysis to identify common patterns and themes related to BMI and cataract risk. The analysis will involve coding the interview transcripts and field notes, followed by categorizing these codes into broader themes. Triangulation will be used to validate the findings by comparing data from different sources and ensuring consistency. The study aims to provide a comprehensive understanding of how an increasing BMI impacts the risk of cataracts, with the goal of informing future interventions and healthcare practices to mitigate this risk. By focusing on qualitative methods, the research seeks to capture the nuanced experiences and insights that quantitative data might overlook.

DISCUSSION

Cataract

Cataract is a disorder of the eye where the pathological condition of the lens becomes cloudy due to hydration of lens fluid or denaturation of lens proteins, so that the view looks like it is covered in fog. This condition is a progressive decrease in lens clarity so that visual acuity is reduced. Cataracts can be experienced at any age depending on the triggering factor. The cloudiness experienced generally occurs progressively, although there are some conditions where there is no change in stage over a long period of time.

The World Health Organization (WHO) estimates that the number of people with vision impairment worldwide in 2018 was 1.3 billion people. Cataracts are the second most common cause of visual impairment worldwide (33%) after uncorrected refractive errors (42%). However, cataracts occupy the first position as a cause of blindness in the world with a prevalence of 51%. There are at least eighteen million people in the world suffering from blindness due to cataracts. In Indonesia itself, based on the results of the 1993-1996

sensory health survey, cataracts are also the main cause of blindness, namely 52%. In Indonesia, it is estimated that every minute one person becomes blind. Most of the blind (visually impaired) people in Indonesia are in poor areas with the current socio-economic conditions in Indonesia being directly proportional to the number of elderly people, which in 2000 was estimated at 15.3 million (7.4% of the total population). The amount in question tends to increase. The number of elderly people in Indonesia in 2025 will increase by 41.4 million people compared to the situation in 2001. This is the highest percentage increase in the entire world, because in the same time period the increase in several countries in succession was Kenya 34.7%, Brazil 25.5%, India 24.2%, China 22.0%, Japan 12.9%, Germany 66% and Sweden 33%.¹⁰

Although age is the most important risk factor for cataracts, there are several other factors that can increase the risk of cataracts, such as metabolic syndrome (a combination of risk factors for heart disease, stroke, and type 2 diabetes), diabetes, smoking, and excessive sun exposure. . Some of these risk factors, such as smoking and excessive sun exposure, can be modified. This means that the risk of developing cataracts can be reduced by making lifestyle changes.¹¹

Cataracts are classified according to their stage, namely: 1) incipient cataract 2) intumescent cataract; 3) immature cataract; 4) mature cataract; and 5) hypermature cataract. In incipient cataracts it starts at the front and back edges. In subcapsular cataracts, the opacification extends from the anterior capsule to the posterior capsule, causing a gap between the lens fibers and the lens cortex, which is filled with degenerative tissue. In intumescent cataracts, there is a lens mass associated with degenerative lens swelling when they absorb water, the lens swells so that the iris is compressed and the eye ball becomes shallow and can cause complications in the form of glaucoma. In immature cataracts, part of the lens becomes cloudy, lens osmotic pressure increases, and lens volume increases. whereas in hypermaturity it is due to the general deposition of calcium ions through the lens. In hypermature cataracts, further degeneration has occurred where the lens hardens or may melt.¹²

Cataract management can be done with surgery. Apart from surgery, non-pharmacological measures can also be carried out. The goal of non-pharmacological management is to prevent defects. Efforts to prevent dependency are by providing health education in the form of socialization about cataracts so that it does not cause disability and other complications.¹³

Body Mass Index

One anthropometric measurement as an indicator of increasing body weight is Body Mass Index (BMI). BMI measurement is a simple measurement and is most often used to determine the condition of fat in the body. 14 Body mass index (BMI) is a way of measuring body weight adjusted for height, calculated using body weight in kilograms divided by the square of body height in meters (kg) /m²). Most BMIs increase across the moderate and severe ranges in overweight, also known as obesity, leading to an increased risk of cardiovascular complications including hypertension, with body fat dyslipidemia, diabetes mellitus, and increased future health risks. High and low BMI predicts future morbidity and mortality. Body Mass Index (BMI) is calculated using the following formulat:¹⁵

$$\text{IMT} = \frac{\text{Weight (Kg)}}{\text{Height (m}^2\text{)}}$$

The results of calculating Body Mass Index (BMI) are classified according to the Asia Pacific Criteria classification into underweight, normal and overweight, with the following number ranges:¹⁵

Klasifikasi	Indeks Massa Tubuh
<i>Underweight</i> (berat badan kurang)	<18,5
Normal	18,5–22,9
<i>Overweight</i> (berat badan lebih)	≥23
Beresiko	23-24,9
Obes I	25-29,9
Obes II	≥30

Figure 1. Classification of Asia Pacific BMI criteria.¹⁵

Relationship between body mass index and cataracts

Cataracts are a disease in which clouding occurs in the lens of the eye which is caused by protein deposits or due to age. The pupils of people suffering from cataracts will be grayish white. In addition, people who suffer from cataracts will feel that their vision is foggy. This is due to reduced transparency of the eye which can hinder the process of light entering the eye due to opacity in the lens of the eye. Based on etiology, the classification of cataracts is divided into age-related cataracts, secondary cataracts and pediatric cataracts.

Research conducted by Sukoco B, et al (2020) in his research entitled Characteristics of Risk Factors for Senile Cataracts in Outpatients at RSIS Makassar found that 15 (12.9%) senile cataract patients had a normal body mass index, 4 (3.4 %) senile cataract patients who were overweight, 51 (44.0%) cataract patients who were pre-obese and 46 (39.7%) patients who were obese.¹⁷

Research conducted by Karunika AR, et al (2022), found that 8 (8.8%) cataract sufferers were underweight, 46 (50.5%) cataract sufferers with a normal body mass index and 37 (40.6%) cataract sufferers with obesity. Based on research by Mihardja et al (2007), the results showed that there was a significant relationship in the increase in the occurrence of cataracts with poor nutritional status due to low vitamin and mineral levels in the body. Research by Caulfield (1999) found that the incidence of nuclear cataracts was 1.2 times greater at a BMI of 17 and 1.13 times at a BMI of 22.5 compared to a BMI of 28. In research by Karira (2018) it was found that there was no significant relationship between factors in the incidence of cataracts are nutritional status and in research by Pujiyanto (2004) it was found that respondents who consumed low protein had a higher risk of developing cataracts. This difference may occur due to incomplete research data and differences in the size of the variables used, so further research still needs to be carried out.¹⁸

Cataracts continue to develop over time, causing progressive damage. Cataracts are characterized by visual disturbances, progressive decrease in visual acuity, glare, changes in color perception can occur with reduced intensity. Cataracts are influenced by several factors such as age, gender, diabetes, hypertension, body mass index and eye trauma.

Obesity is a systemic inflammation with increased levels of C-reactive protein and proinflammatory cytokines as well as increased oxidative stress caused by higher circulating leptin levels, this is associated with cataract formation.³

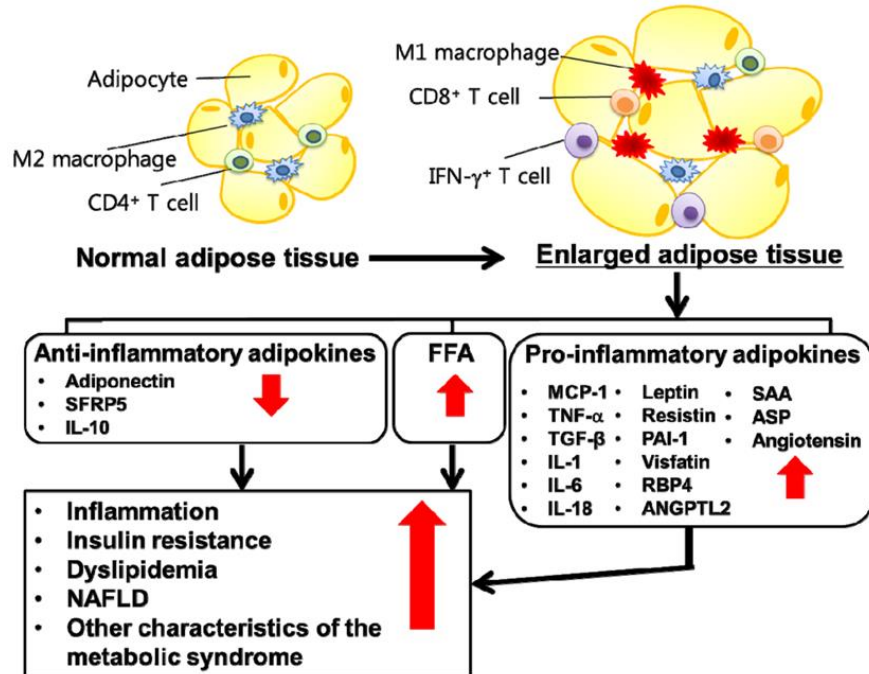


Figure 2. Inflammatory process in obesity.¹⁹

In addition, obesity can affect osmotic stress and non-enzymatic lens proteins. High BMI can also cause protein denaturation. Proteins that accumulate in the lens result in protein coagulation and clouding of the lens. This incident can result in blurred vision and decreased visual acuity. According to research from Sobti S and Sahni B, cataracts can be influenced by high or low body mass index. The study according to Azim et al, stated that populations with a high BMI (>25 kg/m²) had a 4.64 times higher risk of developing cataracts. Ye J et al's research conducted research on populations with low BMI, the results obtained were that someone was at risk of developing cataracts with either cortical or nuclear cortical cataract types. This can happen because low BMI is associated with low socioeconomic status and poor nutrition. Nutritional deficiencies can cause damage to the immune system and reduce antioxidants, such as glutathione, in the body. Glutathione (GSH) functions to protect lens cells from damage by reactive oxygen and free radicals. GSH has an important role in lens transparency by regulating electrolyte balance. There is a GSH-dependent thioltransferase system, including the GSH-transferase enzyme which can repair lens protein oxidation if there is damage. This antioxidant enzyme can prevent lens crystalline aggregation and prevent cataract formation.³

Individuals with obesity have a high amount of systemic inflammation with increased levels of C-reactive protein and proinflammatory cytokines, this can increase the development of cataracts because it causes inflammation in the eyes. Obesity causes an increase in nuclear, cortical and posterior subscapular cataracts. Cataract formation associated with diabetes often occurs due to excess levels of sorbitol (sugar alcohol).

Measuring nutritional status can be done in various ways, one of which is body mass index (BMI). Balanced nutrition includes micronutrients (vitamins and minerals) and macronutrients (fats and carbohydrates). Nutrient deficiencies in micronutrients can cause cataracts. In overweight there is an increase in posterior subcapsular cataracts. Obesity can cause an increase in adipocytes, resulting in an increase in leptin levels, this can cause cataracts. The formation of cataracts is related to changes in lipids in the lens fibers of the human eye. In the lens fibers of the eye, cholesterol is about 40% of the total lipids. When cholesterol levels are high in the lens membrane, it can cause an increase in oxidative stress and cataract formation.

CONCLUSION

Cataract is a disorder of the eye in which the lens becomes cloudy due to hydration of lens fluid or denaturation of lens proteins, so that the vision appears to be covered in fog. In this discussion, it has been identified that there is a relationship between BMI and the occurrence of cataracts, namely obesity. Body mass index has a high influence on the occurrence of cataracts. The occurrence of cataracts in obesity is influenced by increased oxidative stress due to high leptin levels. In writing this literature, the author suggests that for further research, research could be carried out on body mass index and diet or nutrition consumed by cataract sufferers. This is to determine the effect of diet or nutrition on cataract sufferers.

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