



NUTRITIONAL KNOWLEDGE AND PRACTICES AMONG CATARACT PATIENTS ATTENDING SABATIA EYE HOSPITAL, KENYA

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Abstract:

Introduction: According to WHO, cataract is the leading cause of blindness and visual impairment globally. Cataract induces damage to the eye through mechanisms like oxidative stress. Antioxidants are the first line of defense against oxidative stress and are primarily obtained through diet. High intake of food sources of antioxidants has a protective association with the incidence and progression of cataract while poor intake of foods rich in antioxidants has a negative association with the incidence and the progression of cataract. **Purpose:** To establish nutritional knowledge and practices among cataract patients attending Sabatia Eye Hospital, Kenya. **Methods:** A descriptive cross-sectional study was conducted on a sample size of 144 patients and the study area and study population were purposively selected. Using a structured questionnaire, data was collected on demographic and socio-economic characteristics, nutritional knowledge and nutritional practices among the patients. Data collected was subjected to analysis using Social Package for Statistical Sciences version 20. **Results:** The study findings showed that 59% (n=85) of the respondents were female and the most represented age group was 60 years and above with a frequency of n=116 (80.6%). Almost half of the respondents (n=69, 47.9%) attained only primary school education followed by 20.1% (n=29) who attained secondary education. The main source of income for most of the respondents (n=68, 47.2%) was farming and 49.3% (n=71) received less than 5,000 shillings per month. The mean score on knowledge (56.1) was used as the knowledge threshold to put patients into two levels: below average and above average. Less than half, 42.4% (n=61) scored above average on knowledge. In terms of practices, the most frequently consumed antioxidant rich food source was green leafy vegetables consumed by about 66.7% (n=96) at a frequency of once per day. The most consumed source of fiber was whole grains by 82.6% (n=119) patients, consumed once per day. The average individual dietary diversity score was moderate;

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6.5 with the most consumed food group being cereals. However, antioxidant rich food groups had the least scores in the dietary diversity. The use of nutrient supplements was poorly reported with about 93.8% (n=135) indicating that they never use nutrient supplements. **Conclusion:** The study concluded that the patients' nutritional knowledge exists but not to all and the frequency of consumption and the diet diversity of antioxidant rich foods is low. Based on the findings, the study recommended for sensitization on frequency of intake of antioxidant food sources to be done at the community and hospital level through a multidisciplinary approach.

Keywords: nutrition, cataract, knowledge and practices

1. Introduction

Cataract is the clouding of the lens of the eye and is caused by various factors such as those that aggregate and change the lens protein because of chemical reactions which lead to oxidative damage of the lens. Raman *et al.*, (2016) points out that cataracts induce damage to the eye through mechanisms of oxidative stress. In addition, cataracts arise due to different factors. According to Mamatha and Nidhi (2015), they are associated with aging, female gender, genetics and other factors like diabetes, hypertension, body mass index (BMI) and lower education levels. Nuclear cataract has been linked to the intake of diets that are not rich; lower socio-financial status, nonprofessional status and lower standards of education (Prokofyeva *et al.*, 2013). The Age Related Eye Disease Study (AREDS, 2011) indicated that increasing age, diabetes, change in weight and smoking status are related to an increased risk of cortical cataract, whereas male gender, white ethnicity and college education were associated with decreased risk of cortical cataract (Chang *et al.*, 2011). Age, gender, diabetes, weight status and education status appear severally in the above cited examples and they could be some of the factors that indirectly contribute to the oxidative damage of the lens. Data on demographic and socio-economic characteristics is therefore important for a study on cataract.

Cataract is the leading cause of blindness at 51% (World Health Organization, 2010) at the global level and it is therefore a problem of significance in the public health domain. Hong *et al.*, (2015) in their study on the association between visual impairment and depressive symptoms concluded that blindness affects communities by resulting in decreased quality of life and it affects the productivity of both the blind and that of the people taking care of them. This points out the burden of blindness to the society especially at the community and the family level. As the case is in most developing countries in the world, in Saudi Arabia, cataract is responsible for 52.6% of blindness and 20.6% of visual impairment according to a publication by Moustafa *et al.*, (2015). Naidoo *et al.*, (2014) in a review of population based surveys estimated that in Sub-Saharan Africa, cataract was the major cause of blindness at 35% by the year 2010. Similar to Naidoo *et al.*, (2014), (Khairallah *et al.*, 2015) documented that cataract was the

major cause of blindness in all countries in Sub-Saharan Africa region except for two countries namely Cameroon and Uganda. In Kenya, a rapid assessment of avoidable blindness conducted among people aged 50 years and above by Mathenge *et al.*, (2007) established that cataract was the major cause of blindness at 42%. Despite cataract being majorly responsible for blindness and visual impairment, it is exciting to point out that approximately 80% of vision impairment globally is considered avoidable (WHO, 2018). The main treatment to cataract is surgery which is not available to all because of the cost implications (Lee and Afshari, 2017). In addition, the surgery does not always have equal outcomes due to postoperative complications (Kaur *et al.*, 2017). Another limiting factor to treatment is the number of ophthalmologists against the population. Lewallen *et al.*, (2015) estimates that averagely, there is one ophthalmologist per one million people in sub-Saharan African population. Alfredo *et al.*, (2017) factors out that the timing of cataract extraction depends on different factors that can speed up or postpone surgery. Nutrition is one of these factors that interrelates well with eye health in the context of cataract as evidenced via its role in delaying cataract progression. The AREDS as reported by Glaser *et al.*, (2015); on the association of dietary lutein plus zeaxanthin and B vitamins with cataracts is a great example that can be pointed out. The study had a large number of participants and a long duration of follow up and findings confirmed that high intake of antioxidants and vitamins to have a protective affiliation with the incidence and the progression of cataract.

Raman *et al.*, (2015) pointed out that antioxidants are the first line of defense against oxidative stress (which aids in cataract progression) and are primarily obtained through diet. It is also clear that the measure of plasma antioxidants can be increased by consumption of diets that are rich sources of antioxidants such as fruits and vegetables (Cao *et al.*, 1998). Several researchers have proposed the use of nutrition in addressing this problem of public health concern. For example, a recent study by Andrea *et al.*, (2017) on the association between dietary intake of antioxidants and ocular disease recommends for dietary advice towards public health guidelines for a reduction in the risks of cataract. This study therefore proposed to establish nutritional knowledge and practices among cataract patients attending Sabatia Eye Hospital in order to provide baseline information for such public health nutrition intervention strategies.

Specific objectives:

- 1) To establish the demographic and socio-economic characteristics among cataract patients attending Sabatia Eye Hospital;
- 2) To determine nutritional knowledge levels among cataract patients attending Sabatia Eye Hospital;
- 3) To assess the nutritional practices among cataract patients attending Sabatia Eye Hospital.

2. Materials and Methods

2.1 Study Area

The study was conducted in Sabatia Eye Hospital which is an independent nonprofit hospital located in Sabatia sub-county, Vihiga County, Kenya. Vihiga County is an administrative region in the former Western province of Kenya. It borders Nandi County to the east, Kisumu County to the south, Siaya County to the west and Kakamega County to the north. Sabatia sub-county is located on the edge of the rift valley standing at an attitude of about 1300m to 1500m above sea level. It has an average area of 110.4km².

2.2 Study Design

The study design that was used is the descriptive cross-sectional research design. This design allows for data to be collected at a point in time and it describes the characteristics associated with the subjects under the study and reports them as they are.

2.3 Study Population

The study population was patients with cataract attending Sabatia Eye Hospital. The hospital receives patients with different complications e.g. diabetic retinopathy, refractive errors, glaucoma, cataract, allergies amongst other eye diseases.

2.4 Sampling Technique

Systematic random sampling technique was used to select patients to be included in the study. The first sample was picked randomly and the remaining picked at predetermined intervals. Odd or even numbers were used to choose the intervals for sampling. A coin was tossed whereby, head dictated that we begin with the first number in the arithmetic progression of odd-number intervals while tail demanded that we begin with even numbered digit and follow the arithmetic progression in that mode until a point of saturation. A total of 144 patients were sampled. Cochran formulae was used in calculating sample size of the population proportion representing cataract prevalence and it was adjusted using finite population correction for proportions.

2.5 Data Collection

A structured questionnaire was used to collect data and it was divided into two parts: data on demographic and socio-economic characteristics; data on nutritional knowledge and practices. Data on food frequency and dietary diversity was collected using a food frequency table and dietary diversity score sheet. The first section required responses about the patients demographic and economic characteristics; age group, gender, residence, education level and income aspects. Secondly, in the nutrition knowledge section, questions were tailored to assess the patients' basic knowledge on nutrition and

cataract relationship and there were multiple choices for responses. This section did not assess the complex aspects of specific nutrients and their relationship with cataract.

Respondents were asked to report frequency of a list of foods in a specified period of time (e.g. once per day). Assessment of dietary diversity was accomplished by a dietary diversity questionnaire; a user-friendly and low cost assessment tool consisting of a simple count of food groups that a respondent has consumed over specific time frames such as the preceding 24 hours.

A face to face interview was conducted after receiving informed consent from the respondents. Data was collected from the respondents by asking them the questions listed in the questionnaire. The responses were filled in the structured questionnaire for each respondent after which the researcher thanked the patients for their participation in the study.

Validity of the research instrument was ensured first by giving to a panel of competent researchers in the field of nutrition at Masinde Muliro University of Science and Technology (MMUST) and their feedback was put into consideration e.g. consistency of the formatting of the questionnaire with the variables of the study. Furthermore, in order to ascertain that the research instruments were reliable and valid in meeting the study objectives, a pretest was conducted prior to the main study. A test sample of 10% of the study sample size was used, i.e. 14 patients, from an eye clinic were interviewed voluntarily during the pre-testing of the questionnaire. During the pre-test, the time taken to complete a questionnaire was noted besides the comprehension of questions and this was used to modify the tools accordingly. The patients used in the pre-test did not form part of the actual study.

2.6 Data Analysis

Data was entered, coded and cleaned using SPSS version 20. Each response from the questionnaire was assigned numerical values for the purposes of analysis. Descriptive statistics (frequencies and percentages) were computed for demographic and socio-economic data. Analysis was stratified by age, gender, knowledge score, and nutritional practices. For the preliminary analysis of the responses on the knowledge questions, scoring was done to indicate that the patient either 'knows' or 'does not know'. The number of correct responses was then totaled to indicate the number of correct answers provided.

In this study, the indicator of food frequency of the specific food items was the percentage of respondents who consumed that specific food item over the specified time period. The indicator of dietary diversity, the dietary diversity score, was calculated by summing the number of food groups consumed by the individual respondent over a 24 hour recall period. The indicators of food intake (specific food groups) were reported in terms of number/ percentage of respondents consuming specific food items or food groups the previous day e.g. number or percentage of respondents who consumed at least one vitamin-A-rich fruit the previous day.

2.7 Logistical and Ethical Considerations

Approval for this study and research clearance was obtained from Masinde Muliro University of Science and Technology Ethical Review Committee and a research permit obtained from National Commission for Science Technology and Innovation. The researcher also sought permission from the hospitals' administration. Participation consent was sought from the respondents after clearly explaining the objectives of the study. The information obtained from the respondents was encrypted and handled with confidentiality. The patients who took part in the study did so voluntarily and the choice of the respondents was also respected in order to address the principle of autonomy.

3. Results and Discussion

3.1 Demographic and Socio-economic Characteristics

In this study, respondents aged above 60 years formed the majority (80.6%). Age, besides other factors such as exposure to ultraviolet light, corticosteroid use and smoking is a recognized risk factor associated with cataract formation, (Rautiainen *et al.*, 2014). Also, 59% of the respondents were female, slightly more than the males. Similar findings were by Nirmalan *et al.*, (2004) who besides reporting that those aged >70years were 79.4% of the respondents; their study also indicated that males (45.3%) had lower odds for cataract than females (54.9%). Majority of studies related to cataract have found that more women have cataracts than men according to a systematic review on barriers to cataract surgery (Aboobaker and Courtright, 2016). Lee and Afshari, (2017) gave possible explanations such as women having more health seeking behaviour than men or women living longer than men thereby having more time to develop cataracts. According to a study by Rius *et al.*, (2012) that investigated this by controlling for age, women were still found to have higher rates of cataract than men. The same study also indicated a correlation between visual impairment and lower education levels and the results of this study support this finding since almost half of the patients (n=69, 47.9%), had attained only primary education while some (16.7%) did not have any formal education.

This study also established the income sources and income levels of the respondents. Majority (n=68, 47.2%), were farmers at a small scale level. This can also be explained by the fact that majority of the respondents were residents of Western region, which is known for agricultural activities mainly farming with maize as the main crop grown. Studies have also shown that people with low vision had less income (Nirmalan *et al.*, 2004). About 49.3% of the respondents received less than 5000 shillings per month while only 4.9% received more than 20,000 shillings per month. Caulfield *et al.*, (1999) states that cataract risk has been shown to increase even with low socioeconomic status. This could be explained by the inability to access treatment because of the cost implications. According to Lee and Afshari (2017), the cost of surgery is still a barrier to

treatment and it represents a significant expenditure for those in lower socio-economic levels.

3.2 Nutritional Knowledge

All the items evoked different responses from the respondents but indicated that most of the patients had an idea of the role of nutrition in eye health. Widespread knowledge was seen in the relationship between diet and disease. According to Worsely and Anthony (2002), measurement of nutrition knowledge is slightly more complex than summing up simple true or false scores. Using validated methods, it is possible to ask questions and count the number of correct answers in order to assess knowledge and distinguish true from false beliefs. In this study, majority of the patients had knowledge that healthy diet is a key component for promoting eye health with more than half pointing out some of the foods associated with delaying cataract progression. A mean score of 56.1 indicated good knowledge levels among the patients with 42.4% scoring a general score above average. Similar to the findings of this study, a study on nutrition related knowledge and attitudes reflected in lifestyle and health among elderly people across five European countries found that a significant higher proportion of the participants had good nutrition related knowledge when they were of younger age (<75 years); had a higher level of education (college and university) and lived in a suburban area, (Jeruszka-Beliak *et al.*, 2018). Another study on nutritional knowledge and nutritional status among diabetes type 2 patients in Kikuyu Mission hospital, Kenya revealed low nutritional knowledge (69.3%) and a high prevalence of obesity among the respondents unlike this study. The mean nutrition knowledge score was 32 ± 13 and the median was 30. The minimum score was 15 percent while the maximum score was 68 percent. In the knowledge section, questions tested the respondents on knowledge on food sources of foods that help control the blood sugar, foods rich in vitamin C, foods rich in vitamin A and low glycemic index foods; factors considered when choosing food and the meaning of a balanced diet. (Wahome and Kiboi, 2016)

Knowledge on factors that lead to cataract progression was good since more than half of the respondents (n=97, 67.4%) gave correct responses. Theodoropoulou *et al.*, (2014) explains the relationship between foods loaded with vitamins and minerals and foods with high fat or cholesterol levels and cataract development and progression. However, majority of the patients did not know the foods that could be responsible for the progression of cataract development since only 27.8% gave correct responses.

3.3 Nutritional Practices

3.3.1 Food Frequency

This study established the food frequency intake of foods categorized into the following groups: antioxidants, phytochemicals, fats, fiber, vitamins, trace elements, red and white meat and alcoholic drinks. Dietary antioxidants (vitamins C, E and beta carotene) are found mainly in fruits and vegetables. The most consumed antioxidant food source were the green leafy vegetables with 66.7% and 23.6% consuming once per day or more

than once per day respectively. The consumption and utilization of vegetables could be because the vegetables were in season and their prices were lower. Their popularity in consumption could also be because of familiarity with them. The most identified vegetables were pumpkin leaves, *spider plant*, *solanum*, *amaranth*, *crotalaria* and *jute* species which were available because of the rainy season.

Kigaru *et al.*, (2015) in their study on nutrition knowledge, attitude and practices among urban primary school children in Nairobi City, Kenya assessed food frequency using a 7 day food frequency questionnaire. Regarding the consumption of fruits in their study, only 9.4 % reported to have consumed fruits 4–7 times in the previous 7 days prior to data collection as reported from food frequency questionnaire. About 33.2 % had consumed fruits 2–3 times in 7 days while 48.5 % had consumed fruits only once in 7 days. In this study, oranges, egg yolks and raw carrots were mostly consumed at a frequency of twice per month or less (n=81, 56.9% and n=74, 51.4% respectively) indicating that they could be having very little effect on the plasma antioxidant capacity. Bohn, (2008) when looking at bioavailability of non-pro-vitamin A carotenoids stated that the major factors that influence the absorption of carotenoids including lutein and zeaxanthin from food include the nature of the food matrix, e.g., in natural format, cooked or supplement, the amount and nature of the dietary fat, which aids in the solubilisation of released carotenoids, the phospholipids, dietary fiber and lastly the nature of carotenoids. Garlic onions are rich in sulphur which is necessary for the production of glutathione, an important antioxidant necessary for the maintenance of healthy sight yet they were among the less frequently consumed foods. However, only 25% of the respondents consumed garlic once a day.

The most consumed phytochemical food source were beans with more than half (56.9%) of the respondents consuming them on a weekly basis frequency. Majority of the respondents never consume peas and soybeans while lentils were eaten twice per month or less. Soy contains essential fatty acids, phytoestrogens, vitamin E and natural anti-inflammatory agents. One of the reasons for the low intake of most phytochemicals and antioxidant food sources was that they are expensive. Unsaturated fats were frequently used on a once per day basis by 41% of the respondents indicating good practices on use of unsaturated fats versus use of saturated fats among the rural population. 82.6% of the respondents consumed whole grains on a daily basis the main food being ugali. Majority of the residents in the western region have been reported to consume ugali as a favorite meal on a daily basis. Moeller *et al.*, (2004) indicated that consumption of whole grains can reduce lens opacity. However another study showed that people with high intake of carbohydrates are at risk of cortical cataract, Chiu *et al.*, (2005).

The recommended fruit intake is on a daily basis. However, only 39.6% managed to consume fruits on a daily basis. When patients were asked to indicate their seed intake, majority of them were surprised and 68.1% indicated that they threw away the seeds from their meals e.g. pumpkin seeds.

Trace elements such as zinc, selenium, copper or calcium were mostly obtained from cereals on a daily basis followed by fish (25.7%) consumed on a once or twice per week frequency. Milk was consumed by a larger proportion of the respondents but mostly in the form of milk tea. Respondents who indicated to take milk on a once per day frequency indicated that it was in form of milk tea. Most patients were farmers with cows which provided milk daily for household consumption. Yan *et al.*, (2016), on the risk of tea and age related cataracts found a significant protective role of tea ingestion against cataracts in older people. The results of the study indicated that average daily intake of two cups of tea with a moderate concentration may inhibit age related cataract. Tea extracts have flavonoids which inhibit free radical generation and also scavenge for free radicals and are considered to be more effective than antioxidants from fruits and vegetables (Vinson *et al.*, 1995). Contrary to this study, their study focused on green tea and black tea but did not point out whether respondents were consuming milk tea too. The same study pointed out that the protective effect of tea on cataracts might be dependent on its concentration. Mutton was rarely reported for consumption probably because of little preference over beef as red meat choice for the respondents. Chicken was also consumed twice per month by 85.4% of the respondents. It is considered a ceremonial meal in the western region thereby this could explain why it is rarely consumed.

3.3.2 Dietary Diversity

Individual dietary diversity is a proxy measure of the nutritional quality of an individual's diet and more particularly the micronutrient adequacy of a diet. Rathnayake *et al.*, (2012) in their study using a single 24 hour recall concluded that dietary diversity score is a useful proxy indicator of nutrient adequacy of rural elderly people and the performance of indicators improves when quantity of food consumed is considered. One of the limitations of this study is that it did not include the quantities of foods when estimating the dietary diversity score. Dietary diversity score was based on 14 groups to determine the proportion of respondents scoring low, average and high scores.

Cereals, dark green leafy vegetables, other vegetables, milk and milk products and oils and fats were the most consumed food groups because of their availability. Habe and Krawinke (2016) say that cereals form major component of the diet in North, East and South Africa maize, sorghum and millet being predominant in East and South Africa. Matin *et al.*, (2014), in their study the results showed that being on a diet according to the food guide pyramid and the healthy eating index is correlated with a reduced risk of cataract. The scores of fruits, vegetables, sodium and also food diversity in patients with cataract was lower than that in the control group. Conclusively, the study findings indicated that a high intake of fruits and vegetables reduced the risk of cataract incidence and progression thereby confirming the results of other studies. This study indicated that fruit and vegetable intake was high on a daily basis but did not

quantify the amounts to establish effect on plasma antioxidant status. In addition, the methods of preparation could be inadequate hence not being effective.

The foods of interest that were least consumed were carotene rich vegetables, Vitamin A rich fruits, other fruits, organ and flesh meats and eggs. According to Handleman *et al.*, (1999) the concentrations of lutein and zeaxanthin in chicken egg yolk are $292 \pm 117 \mu\text{g/yolk}$ and $213 \pm 85 \mu\text{g/yolk}$ (average weight of yolk is about 17–19 g), respectively and are likely dependent on the type of feed, found mainly in on-esterified form with minute amounts of lycopene and β -carotene. Chicken egg yolk is deemed a better source of lutein and zeaxanthin compared to fruits and vegetables because of its increased bioavailability due to the high fat content in eggs. Results of a study by Appleby *et al.*, (2011) showed that the risk of cataract among female and male who consumed high levels of meat and dairy products (>100g per day) was higher than that of vegetarian and people who consumed less meat than others. Majority of the respondents were elderly with tooth problems hence eating meat was limited because of limited chewing. Diverse diets have been shown to protect against chronic diseases and improve health status (McCullough *et al.*, 2002). The mean dietary diversity was 6.5, an average score. This could be used as a predictor of patient health because an increased dietary diversity has been shown to be linked to higher energy intake, body composition and serum albumin, iron, folate among other biochemical markers according to Bernstein *et al.*, (2002). It would however be of significance if follow up is done to the households to determine the effect of food preparation on nutrient density of food in order for it to have an impact on plasma nutrient status. The reason for a reasonable diversity score despite the low monthly income among most of the respondents could be because of the season. This study was carried out at a time of harvest indicating that most of the households had access to variety of foods. Similar to this study, a study by Muthike *et al.*, (2015) used the FAO cutoff points to classify Dietary Diversity Scores. However, the reported score consisted of a total of nine food groups. A score ranging 1-3 was considered low, 4-7 was considered moderate and ≥ 8 as high. More than two thirds (62.3%) of the patients had adequate score.

3.3.3 Use of Nutrient Supplements

Many studies have been conducted to establish the role of nutrient supplements in cataract risk. This study unfortunately reported poor usage of nutritional supplements among the cataract patients and on such a low frequency yet Christen *et al.*, (2014) and Chew *et al.*, (2012) in their studies showed that daily usage of multivitamins slowed down the progress of both nuclear and cortical cataracts. Christen *et al.*, (2014) in their study gave subjects multivitamins such as vitamin E, C and beta carotene. In this study, only 6.25% (n=9) of the respondents reported to use nutrient supplements once in a while identified as either multivitamin supplements or B- complex vitamin for other health conditions other than cataract. This is because the patients lack knowledge on the use of nutrient supplements for delaying cataract progression and may not be able to use them consistently because they are costly.

4. Conclusion

The results support reports from prior studies that have linked cataract to age, gender, lower education levels and lower socio-economic status.

The results indicated that nutritional knowledge exists (a mean score of 56.1), especially on the relationship between diet and disease since almost 42.4% of the patients scored above average.

The frequency of food consumption showed that green leafy vegetables were the highest consumed antioxidant food source. This is probably because of the rainy season whereby there is abundance of vegetables and it is the time when the study was conducted. In terms of dietary diversity, carotene rich vegetables and tubers, organ meats and eggs; food sources of nutrients that delay cataract progression; were the least consumed foods. A big proportion indicated to never use nutrient supplements while those who use them did not target cataract but for other health purposes.

5. Recommendations

Further research can take a longitudinal approach in order to follow up the patients' nutritional practices at home.

Future research can target both the patients and the ophthalmic practitioners and also assess their attitudes on the use of nutrition in the management of cataracts.

Authors Contribution

The concept of the study was developed by Enid Keseko and all the coauthors participated in its development, data collection and analysis as well as critical revision of the drafts of the paper. All authors read and approved the final manuscript.

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NUTRITIONAL KNOWLEDGE AND PRACTICES AMONG CATARACT PATIENTS
ATTENDING SABATIA EYE HOSPITAL, KENYA

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