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Research Article

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Ocular Manifestations in Iranian Hemodialysis Patients: A systematic review and meta-analysis

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Abstract

Objective: The aim of this study was to evaluate Ocular Manifestations in Iranian Hemodialysis Patients.
Method: The related literature was collected by using medical subject headings (MeSH) and keywords related to Ocular Manifestations in Iranian Hemodialysis Patients. For findings the related studies, the researchers searched the electronic databases including the international databases (MEDLINE [PUBMEDINTERFACE], GOOGLE SCHOLAR and ISI web of science [web of scientific interface]), the national databases (MAGIRAN, SID), and the related national journal.
Result: These studies had been conducted on 161 participants. The main design of the studies was cross sectional. These studies had been conducted only in 2 provinces out of 31 provinces of the country. studies were from Isfahan and Zanjan Provinces. all of the studies had been conducted in medical centers (n=2). The studies had been conducted with a simple random sampling method and had low likelihood bias. Based on the results of random effects model, the Prevalence of Ocular Manifestations in Iranian Hemodialysis Patients in 161 patients was %88.7(95% confidence interval [CI]: 83.8, 93.5)
Discussion and conclusion: cataracts have been reported to be the most common ocular complications in the present study. Given the high prevalence of these complications in hemodialysis patients, it is highly significant to conduct a regular monitoring for having an early diagnosis and effective treatment, so that the patients' quality of life is improved

Keywords: ocular complication , ocular complication , hemodialysis , renal failure

Introduction

Hemodialysis is a treatment method for end-stage renal disease patients (ESRD). In hemodialysis, blood is removed from the body and pass through a filter (1). Its chemical composition is thus changed to remove the waste components by semipermeable membranes and the blood is re-added to the body (2). In this method, in addition to removing the waste components, the essential materials are added to the blood as well (3). Most of the patients need 9-12 hours of dialysis in a week; this is conducted in several sessions. However, nowadays, kidney transplantation is a common operation that is very helpful for ESRD patients (4). At present, dialysis is applied in a number of cases including uremic encephalopathy, polyserositis, sensory-motor nerve damages (neuropathy) arising from urea, severe and irreversible accumulation of fluid in the body, hyperkalemia (increased blood potassium level), and metabolic acidosis (5). Diabetic nephropathy occurs after hypertensive nephroangiosclerosis and primary and secondary glomerulopathies and results in dialysis at the end stages (6). Hemodialysis is likely to result in ocular complications or exacerbation f eye disease that have already been there (7).The typical ocular symptoms a nephrologist might encounter include red eye, ocular irritability, eye pain, and visual acuity change (8). For making an early diagnosis of ocular changes to improved these patients' quality of life as well as determining a criterion for evaluating the severity and duration of their renal failure, the present study aimed at determining the frequency of ocular manifestation in Iranian hemodialysis patients.

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Materials and Methods

Eligibility criteria

The method applied for this systematic review was PRISMA guidelines (Moher et al, 2009). Observational studies were included in the present study as well. Moreover, case studies, case reports, clinical trials, and reviews (systematic and narrative reviews) were excluded. The related literature was collected by using medical subject headings (MeSH) and keywords related to Ocular Manifestations in Iran. For findings the related studies, the researchers searched the electronic databases including the international databases (MEDLINE [PUBMEDINTERFACE], GOOGLE SCHOLAR and ISI web of science [web of scientific interface]), the national databases (MAGIRAN, SID), and the related national journal. The formal screening procedure was conducted by two researchers and based on the eligibility criteria as well as consensus (in case of disagreements). The full texts of the articles were provided for all headings having the required eligibility criteria. Other information was collected from the study, so that all questions regarding the eligibility criteria were responded. The exclusion criteria were recorded. None of the authors of the review had any prejudices about the journals, authors, and institutions related to the study. The data extraction items included the general information (corresponding author, publication year, and province), characteristics of the study (study design, sampling method, data collection tool, research location, sample size, abbreviated heading, characteristics of the questionnaire, and psychometric features), and participants' characteristics (demography and sample size). Hoy et al's risk of bias tool was applied for assessing the quality of the study (Hoy et al, 2012).

Results

Research selection

In total, in the initial search, as many as 241 articles were obtained from different databases. From 241 non-duplicate studies, 226 articles were excluded for having non-related subjects. From the remaining 15 studies, 2 cases had the required legibility criteria. From 13 excluded articles, 2 cases were reviews, 6 articles were qualitative, 2 cases were letters to the editor, 3 cases were not full texts.

Characteristics of the study

These studies had been conducted on 161 participants. The main design of the studies was cross sectional. These studies had been conducted only in 4 provinces out of 31 provinces of the country. studies were from Zanjan and Isfahan Province. Most of the studies had been conducted in medical centers (n=2). The studies had been conducted with a simple random sampling method and had low likelihood bias (n=2) (figure 1).

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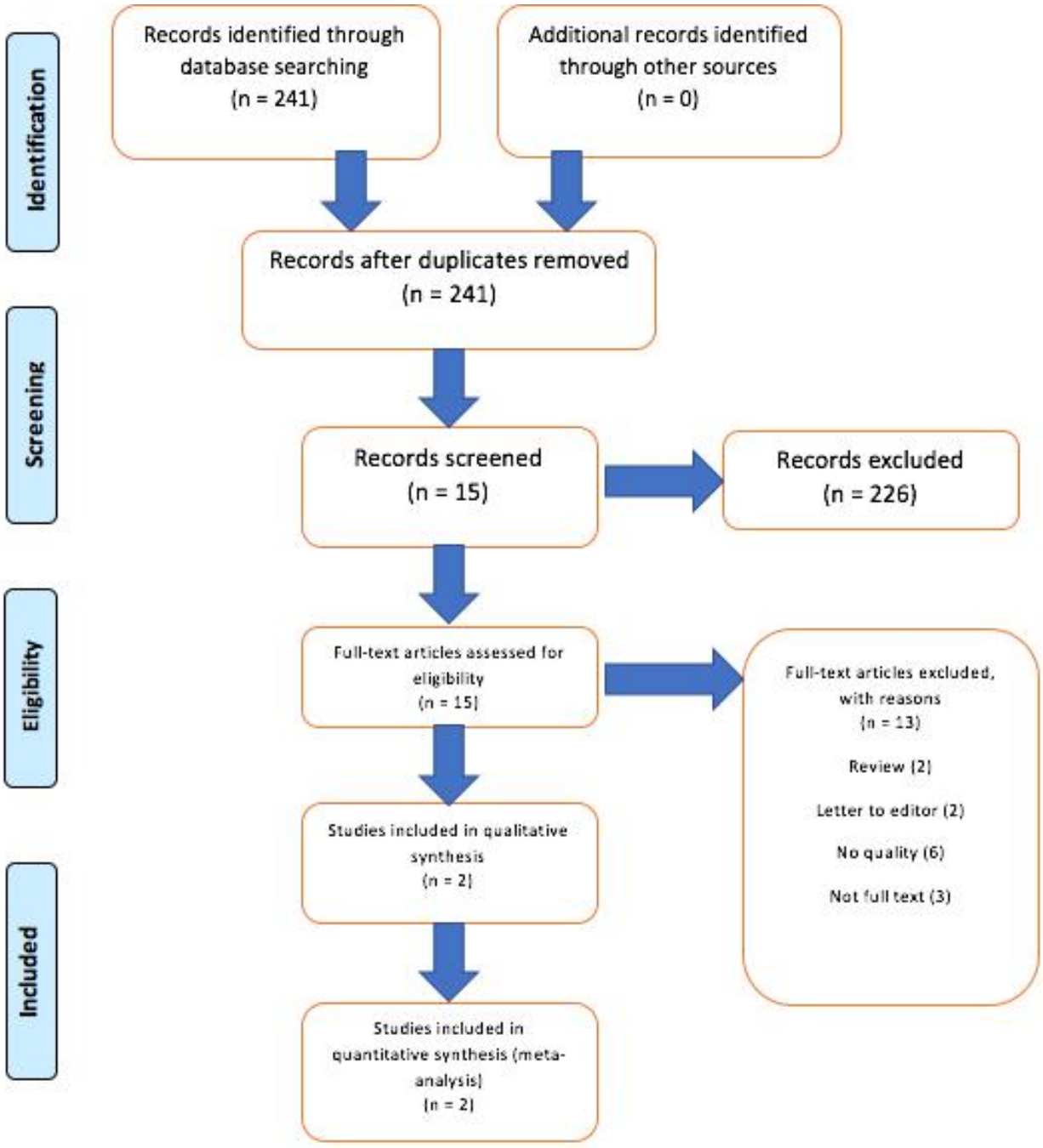

Fig 1.

Table 1:**Characteristics of final included studies about prevalence of Ocular Manifestations in Iranian Hemodialysis Patients**

ID	Author	Year	Province	N	Prevalence	age	Bias
1	Derakhshandeh[21]	2001	Zanjan	40	87.5%	51-60	low
2	Kianersi[22]	2018	Isfahan	121	89.3%	51.59±16.01	low

Meta-analysis Prevalence of Ocular Manifestations in Iranian Hemodialysis Patients

Based on the results of random effects model, the Prevalence of Ocular Manifestations in Iranian Hemodialysis Patients in 161 patients was %88.7(95% confidence interval [CI]: 83.8, 93.5) (table 3) .

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Table 2:**shows the quality of the articles that is calculated using a checklist which includes 5 criteria.**

ID	Author	Year	Sample size	cataract	Corneal calcification	Optic atrophy	Diabetic retinopathy
1	Derakhshande	2001	√	√	*	√	√
2	Kianersi	2018	√	√	√	*	*
3	Alishiri[23]	2002	√	√	√	*	√
4	Eslami[24]	2017	√	√	*	*	*

Table 3: Prevalence of Ocular Manifestations in Iranian Hemodialysis Patients

Study	Year	ES	95% conf. Interval		%weight
			Low	Up	
Derakhshandeh	2001	0.875	0.773	0.977	22.98
Kianersi	2018	0.89	0.834	0.946	77.02
Pooled ES	------	0.887	0.838	0.935	100

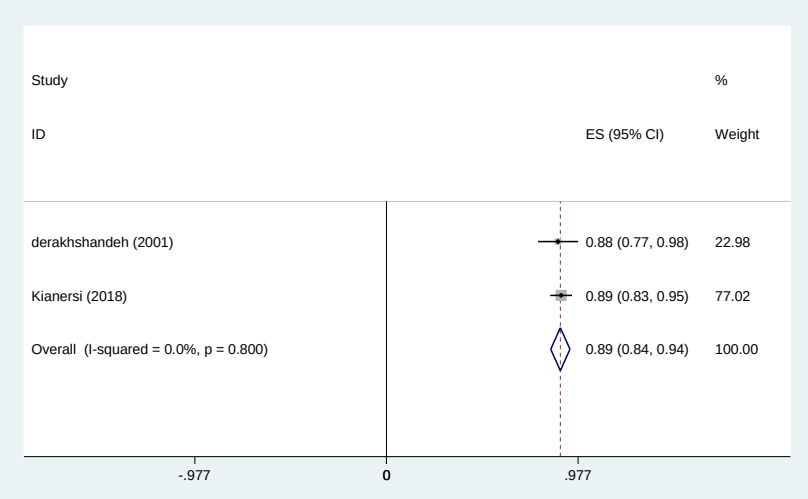

Fig. 2 :The Prevalence of Ocular Manifestations in Iranian Hemodialysis Patients and its 95% interval for the studied cases according to the year and the city where the study was conducted based on the model of the random effects model. The midpoint of each section of the line estimates the% value and the length of the lines showing the 95% confidence interval in each study.

Discussion

Based on the results of random effects model, the Prevalence of Ocular Manifestations in Iranian Hemodialysis Patientsin 161 patients was %88.7(95% confidence interval [CI]: 83.8, 93.5) .The aim of dialysis is maintaining acid-base status and body's electrolytes, removing extra metabolic materials, and reaching the normal physical conditions (9-11). Nowadays, continuous dialysis results in the reduced mortality rate of renal failure patients as a result of uremia and its complications (12). However, long survival and promoted quality of life in these patients are regarded as the main aims to be achieved (13).Dialysis patients' survival and quality of life are affected by numerous factors including the type of underlying kidney disease and the presence of other underlying diseases such as hypertension and conditions such as infections, malnutrition, the incidence of inflammatory conditions, and psychosocial disorders occurring in these patients (14-16). The studies have indicated that the presence of inflammatory conditions and increased pro-inflammatory cytokines in dialysis patients are resulted from dialysis associated infections, uremia, contact with the surface of pipes and membranes, infections related to the catheter, and contact with solutions associated with increased acute-phase reactants (17). Inflammatory conditions and infections are likely to bring about malnutrition in dialysis patients; malnutrition is associated with increased morbidity and mortality in these patients. Retinal microvascular abnormalities are resulted from hypertension (18). Moreover, renal artery disease is prevalent in more than half of diabetic patients suffering from renal failure(19). These are regarded as the old risk factors

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for microvascular diseases. Furthermore, new risk factors including inflammation, calcification, and endocrine dysfunction increase the risk of vascular diseases. Recent studies have confirmed the relationship between renal diseases and age-related macular degeneration.

Retinopathy is a cover term used for describing vascular problems created in the patients' retina. Although this vascular damage is likely to have no effect on individuals' vision and have no symptom helping the patient diagnose this damage in his/her eyes, if retinal macula has vascular damages, a reduced vision is likely to occur. Retinopathy seems to affect reduced vision through damaging the macula (20).

Cataracts have been reported to be the most common ocular complications in the present study. Given the high prevalence of these complications in hemodialysis patients, it is highly significant to conduct a regular monitoring for having an early diagnosis and effective treatment, so that the patients' quality of life is improved.

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