

Prevalence of Cytomegalovirus Infection among Iranian Kidney Graft Recipients

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Abstract

Introduction: Kidney transplantation is nowadays the most effective treatment for patients with chronic renal failure. 24 per million cases of kidney transplantation is annually performed in Iran and about 1700 individuals undergo kidney transplants per year. . Infections are the second leading cause of admission for organ recipients during the first year after transplantation. The aim of this study is to evaluate the Prevalence of Cytomegalovirus Infection among Iranian Kidney Graft Recipients.

Methods: The methods used for this systematic review were based on the "Cochrane Systematic Study Booklet" and "Appropriate Items for Systematic and Meta-Analysis Study (PRISMA)" tool. To search for headlines and abstracts, boolean (AND, OR, NOT), mesh, coordinate {truncation} * and related words were used; following keywords were used to provide a comprehensive context: cytomegalovirus, kidney Transplantation , infection.

Results: Based on the results of random effects model, the Prevalence of Cytomegalovirus Infection Among Iranian Kidney Transplant Recipients in 1693 patients was %27 (95% confidence interval [CI]: 25, 29,1, $I^2 = 95,7\%$).

Discussion: In addition to showing seasonal relationship between renal transplantation and CMV infection with sensitive methods, the present research, indicates the importance of timely and accurate diagnosis of the active, and the presence of latent, form of infection and the onset of its activity after transplantation; this can be helpful in providing therapeutic solutions

Keywords

cytomegalovirus,
kidney
Transplantation,
infection

Introduction

Kidney transplantation is nowadays the most effective treatment for patients with chronic renal failure; there are annually conducted a large number of kidney transplants around the world. It is estimated that around 1.4 million people worldwide have had transplantation, and this trend is growing by 8% each year (1-3). 24 per million cases of kidney transplantation is annually performed in Iran and about 1700 individuals undergo kidney transplants per year.

Infections are the second leading cause of admission for organ recipients during the first year after transplantation(4). Human cytomegalovirus infection has spread throughout the world. The most important negative consequences of this infection in transplant recipients differs from clinical manifestations of acute CMV disease to damage to the transplant or rejection of the transplant(5). The virus has direct and indirect effects on kidney retention. It is estimated that about

58-80% of the kidney recipients with no prophylaxis are susceptible to cytomegalovirus disease, which can cause febrile syndrome, hepatitis, pneumonia, colitis, Leukopenia, esophagitis, pancreatitis, and encephalopathy(6). The indirect effects on transplanted patients are increased by hypersensitivity to other opportunistic organisms. Human cytomegalovirus infection has been found all around the world(7). The most important negative consequences of this infection in transplant recipients differs from clinical manifestations of acute CMV disease to damage to the transplant or rejection of the transplant(8). Despite the use of antiviral drugs and several measures taken to prevent it, this infection is still a major cause of disease and mortality after bone marrow transplantation and kidney transplantation.

Methods

Eligibility criteria

The methods used for this systematic review were based on the "Cochrane Systematic Study Booklet" and "Appropriate Items for Systematic and Meta-Analysis Study (PRISMA)" tool. Observational studies conducted on general population have been added and studies conducted on specific population have been removed. Results are summarized as reported in the research. The minimum sample size was 25 patients in each study. The target population covers the total population of Iranian Kidney Transplant Recipients with cytomegalovirus infection who entered the study. Prevalence of Cytomegalovirus Infection among Iranian Kidney Graft Recipients was calculated in this study.

Searching strategies and databases

The review of references and resources was done using the Medical Subject Headings (MeSH) and keywords related to the source of information on Prevalence of Cytomegalovirus Infection Among Iranian Kidney Transplant Recipients. To find references, the international Databases (MEDLINE PubMed interface), Google Scholar, and Web of Science) and domestic databases (SIDs and Magiran) and journals were searched; unlimited searching, in terms of both setting and language, was done until June 30, 2018. PRESS standard and the Health Sciences Librarian were used for designing the strategy.

MEDLINE application was used to search other databases. In addition, PROSPERO was used to provide a systematic search that was completed recently. To search for headlines and abstracts, boolean (AND, OR, NOT), mesh, coordinate {truncation} * and related words were used; following keywords were used to provide a comprehensive context: cytomegalovirus, kidney Transplantation, infection.

Research selection and data extraction

According to the research protocol, two researchers observed the titles and abstracts separately according to the eligibility criteria; in the next step, after the removal of repeated studies, the full text of the paper was studied based on the eligibility criteria and the required information was extracted. Consensus method was used to solve the disagreements between two researchers. The extracted data included the general information (corresponding author, year and place), characteristics of the research (research design, sample size, location, study period, and risk of bias), and characteristics of participants.

Quality control

To assess the quality of the methodology and bias risk, each observation study was evaluated using a tool developed by Hoy et al; this 10-item scale evaluated the quality of the study in two dimensions, including external credentials (items 1 to 4 target populations, sampling frame, sampling method, and minimum indirect neglect) and internal validity (items 5 up to 9 covering methods for data collection, case definition, study tools, and data collection mode and item 10 covering assessing relevant assumptions or analyzes). The risk of abuse was assessed by two researchers separately and possible disparity of ideas was resolved by consensus.

Aggregation of data

All eligible studies were included within the systematic review. The data was combined using forest plot graph; random effects model was used to evaluate Prevalence of Cytomegalovirus Infection Among Iranian Kidney Transplant Recipients. The heterogeneity of primary studies was assessed by performing I^2 tests.. Meta-analysis was performed using the STAT 14 statistical software.

Results

1. Selecting eligible papers and researches

In the initial search on various databases, a total of 261 articles were reviewed, 232 of which turned out to be repetitive during screening process of title and

abstract. 19 articles were removed due to unrelated title; out of the remaining 10 articles, 4 articles met the inclusion criteria. Of the 6 articles that were removed, 2 were reviews, 1 were letters to editors, 2 had no complete text, and 1 had low quality and could not be considered in the research. (Figure 1).



PRISMA 2009 Flow Diagram

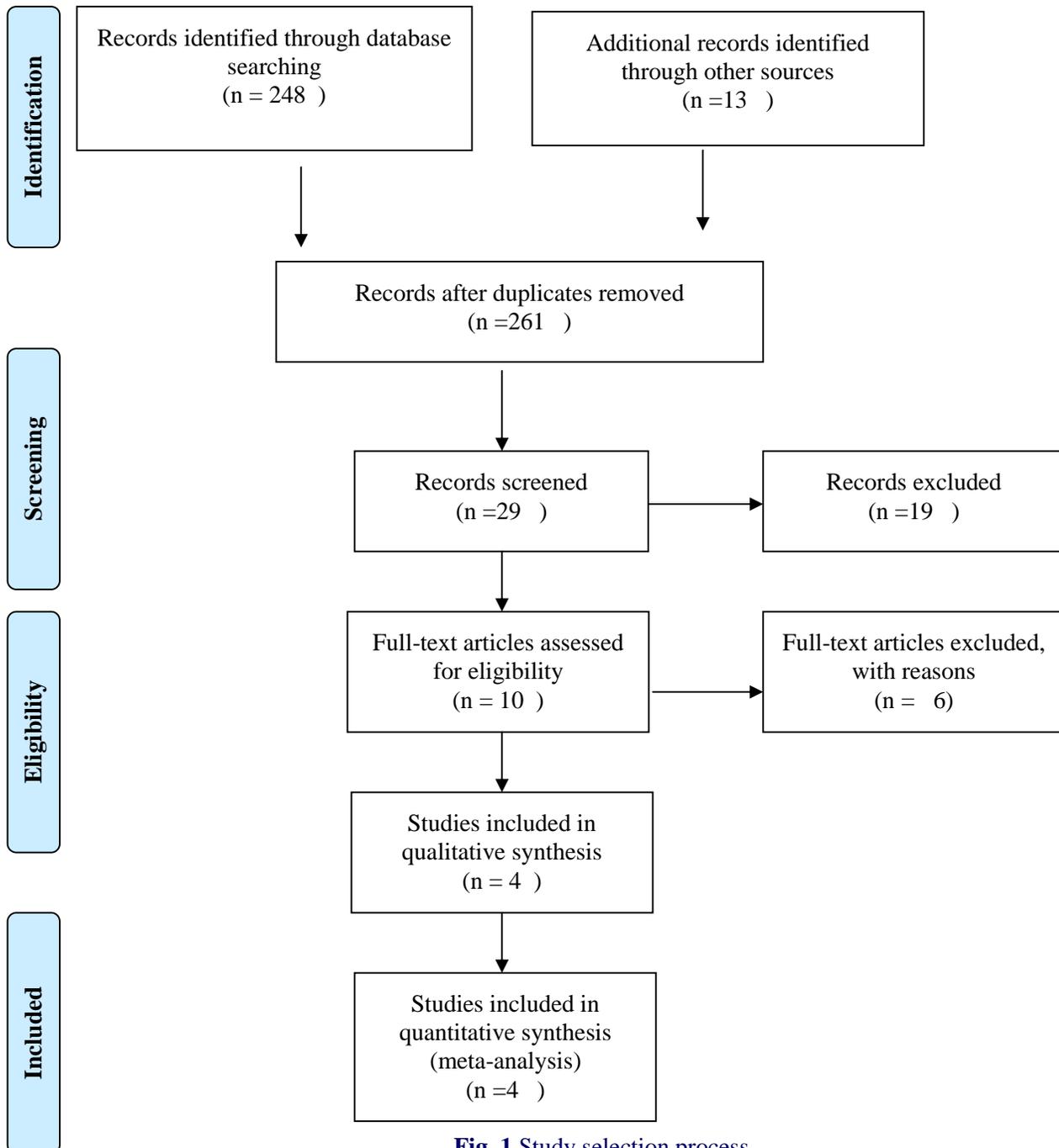


Fig. 1 Study selection process

2. Characteristics of the researches and papers

The final research was conducted on 1693 participants; with an age range of 18 to 60years old; a cross-sectional design was used in all studies. Research was conducted in only 3 provinces out of 31

provinces of Iran. Of the 4 studies [10-11], Two were from Tehran [10], one from Urmia [11]and One from Mashhad. Required data was collected through interview (n = 4) and had a low bias risk (n = 4) (Table 1).

Table 1: Characteristics of final included studies about Prevalence of Cytomegalovirus Infection Among Iranian Kidney Transplant Recipients

ID	Author	Year	N	City	Prevalence	Bias
1	Khameneh ^[14]	2013	96	Urmia	%37.5	Low
2	Nafar ^[15]	2014	427	Tehran	%16.6	Low
3	Fallahi ^[16]	2009	923	Tehran	%35	Low
4	Eidgahi ^[17]	2108	247	Mashhad	%22	Low

Meta-analysis Prevalence of Cytomegalovirus Infection Among Iranian Kidney Transplant Recipients

Based on the results of random effects model, the Prevalence of Cytomegalovirus Infection Among

Iranian Kidney Transplant Recipients in 1693 patients was %27 (95% confidence interval [CI]: 25, 29, I² = 95,7%) (table 2) .

Table 2: Prevalence of Cytomegalovirus Infection Among Iranian Kidney Transplant Recipients

Study	Year	ES	95% conf. Interval		% weight
			Low	Up	
Khameneh	2013	0.375	0.279	0.471	4.42
Nafar	2014	0.166	0.131	0.201	32.74
Fallahi	2009	0.350	0.321	0.379	47.15
Eidgahi	2018	0.220	0.169	0.271	15.69
Pooled RR	-----	0.270	0.250	0.291	100

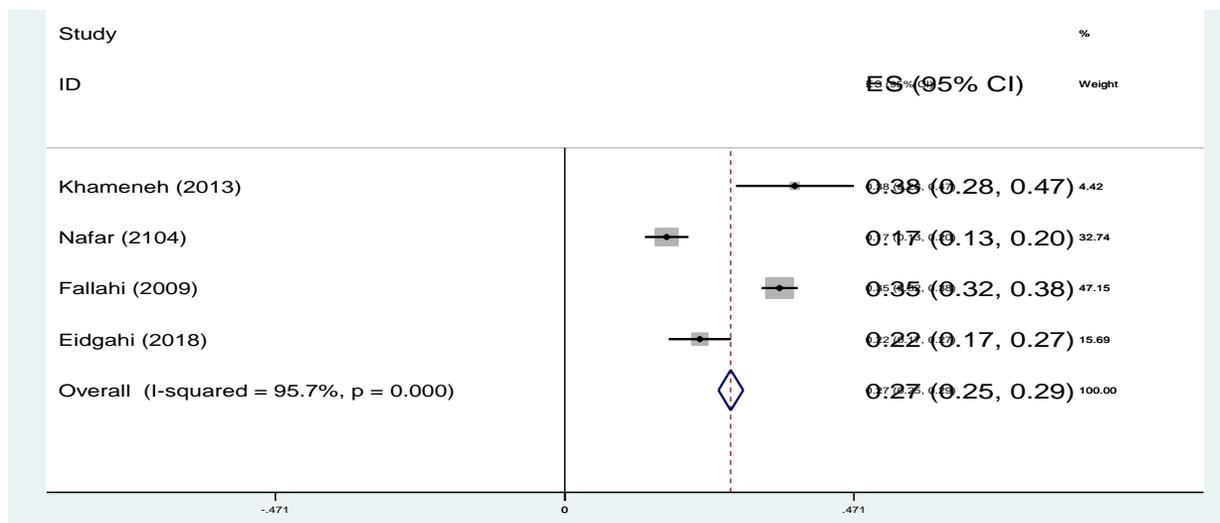


Fig. 2 :The Prevalence of Cytomegalovirus Infection Among Iranian Kidney Transplant Recipientsand its 95% interval for the studied cases according to the year and the city where the study was conducted based on the model of the random effects model. The midpoint of each section of the line estimates the% value and the length of the lines showing the 95% confidence interval in each study. The oval sign shows Relationship between Helicobacter pylori infection and spontaneous abortion for all studies.

Discussion and Conclusion

Human Cytomegalovirus (CMV) is one of the most common infections in human populations that is asymptomatic in healthy individuals(9). However, it remains permanently in the body after the initial infection. Acute infection occurs in, both, patients with auto-immune diseases and transplant recipients(10). Despite the administration of efficient antiviral drugs (Gancyclovir and Foscarent), CMV infection is still an important cause of disease and mortality in transplanted patients, which is often the main cause of the delay in diagnosis and treatment(11 & 12). The potential of this disease and an attempt to diagnose and treat this condition is of paramount importance in kidney transplant recipients, especially during the first 6 months after transplantation(13). The use of immunosuppressive drugs after kidney transplant increases the risk of opportunistic infections. Due to the fact that no prophylaxis is prescribed for transplant patients admitting to this center, infection with cytomegalovirus is of high prevalence. Therefore, in order to reduce the incidence and mortality, the use of appropriate preventive and effective therapies against CMV and administrating efficient follow up until six months after transplantation is recommended for the patients.

Based on our research the Prevalence of Cytomegalovirus Infection Among Iranian Kidney Transplant Recipients in 1693 patients was %27 (95% confidence interval [CI]: 25, 29,1, $I^2 = 95,7\%$)

In addition to showing seasonal relationship between renal transplantation and CMV infection with sensitive methods, the present research, indicates the importance of timely and accurate diagnosis of the active, and the presence of latent, form of infection and the onset of its activity after transplantation; this can be helpful in providing therapeutic solutions.

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