Research Article

Prevalence of pulmonary infection in Iranian renal transplant recipients: a systematic review and meta-analysis

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Abstract

Introduction: Renal transplantation is the most effective treatment for chronic kidney disease. Infectious complications that occur after the transplantation are highly pathogenic. This research was aimed to discover about the quantity of pulmonary infections after renal transplantations in Iran.

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. 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.

Results: The final research was conducted on 751 participants; with an age range of 15 and 80 years old; a cross-sectional design was used in all studies. Research was conducted in only 2 provinces out of 31 provinces of Iran. Based on the results of random effects model, the Prevalence of pulmonary infection in Iranian renal transplant recipients in 751 patients was 8.1% (95% confidence interval [CI]: 6.2, 10).

Conclusion: Since 8.1 percent of renal transplantation patients suffer from pneumonia and regarding the effect of pneumonia in mortality, we need to be aware of its clinical symptoms, types of organisms, and rapid diagnosis and treatment of this disease. Generally, this paper aims to represent the role of these infections in pathogenicity and mortality. Hence, it is recommended to identify risky patients in the time of transplantation using serologic tests and to do their follow-up tests with more scrutiny. Also, it is suggested that all infections be cured before the operation. Finally, in case of acute infections, empirical treatment needs to be initiated before the lab results are prepared.

Keywords: pulmonary infection, pneumonia, ESRD, transplantation, complication on renal transplantation

Introduction

Renal transplantation is the most effective treatment for chronic kidney disease. After this operation, patients are relieved from the agony of dialysis and return back to a better life. The first renal transplantation ever dates back to 1954. Infection is one of the most significant reasons for the death of the receivers of the organs. Also, it increases the possibility of acute transplant rejection. Infectious complications that occur after the transplantation are highly pathogenic. They are the most common reasons for fatality in the early stages of transplantation. On average, 50 percent of the patients who use immunosuppressive drugs experience infection during the first 6 months after the operation. One to six months after the transplantation, the level of immunosupression is at its maximum and infection form and pathogen types are unnatural. During this period it is necessary to use rapid diagnostic methods urgently. If pneumonia is diagnosed within the first 5 days then the chance of survival is 80 percent. If diagnosed later, this chance is 35 percent. Six months after the transplantation, due to rapid decrease of

immunosupression level, most of the acquired infections get involved. Among the culprits of lung infection are mycobacterium infections, fungi infections, haemophilus influenza and pneumococcus. The most common rental transplantation-related infection with the highest mortality is infectious pneumonia. Due to immunosupression, the clinical and radiological profiles of these patients are not normal. These symptoms, being long-term complications of the infection, reduce the survival of renal transplantation patients. Hence, it is necessary to do researches in this regard to prevent such complications. This research was aimed to discover about the quantity of pulmonary infections after renal transplantations in Iran.

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. Prevalence of pulmonary infection in Iranian renal transplant 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 the incidence of Prevalence of pulmonary infection in Iranian renal 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: pulmonary infection, pneumonia, ESRD, transplantation, complication on renal transplantation , long time complication, and prevalence rate and percent.

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 heterogeneity of primary studies was assessed by performing I^2 tests. Subgroup analysis was conducted to determine the heterogeneity based on the participants in the study, gender, and age. 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 421 articles were reviewed, 307 of which turned out to be repetitive during screening process of title and

abstract. 89 articles were removed due to unrelated title; out of the remaining 15 articles, 4 articles met the inclusion criteria. Of the 11 articles that were removed, 3 were reviews, 2 were letters to editors, 3 had no complete text, and 3 had low quality and could not be considered in the research. (Figure 1).
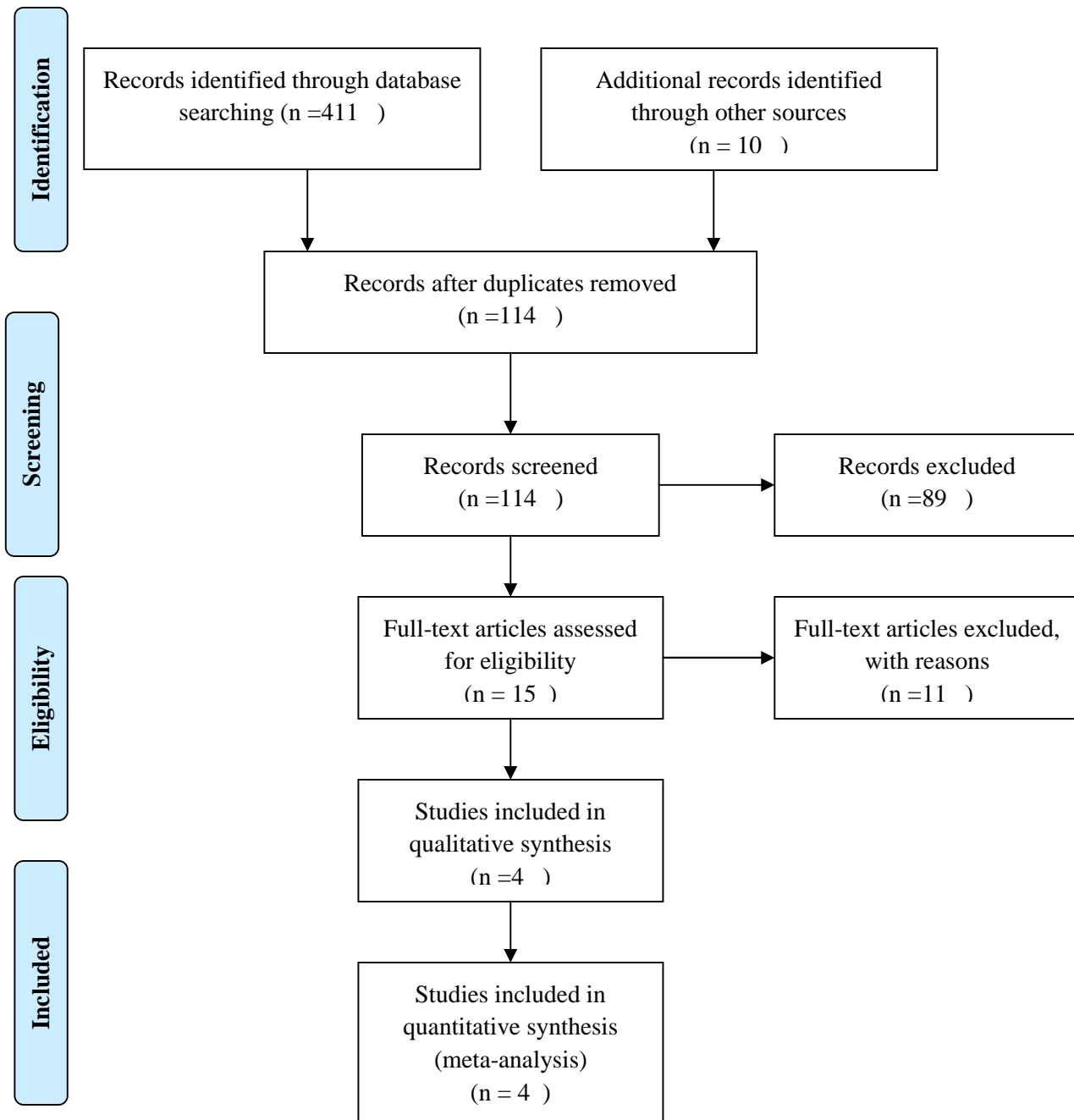
PRISMA 2009 Flow Diagram

Fig. 1 Study selection process

2. Characteristics of the researches and papers

The final research was conducted on 751 participants; with an age range of 15 and 80 years old; a cross-sectional design was used in all studies. Research was conducted in only 2 provinces out of 31 provinces of Iran. Of the 4 studies, 3 were from Tehran [12-14], one from Isfahan [18]; the majority of papers were conducted on outpatient cases through random sampling. 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 pulmonary infection in renal Transplantation in Iran

ID	Author	Year	city	N	Type of study	prevalence	Bias
1	Rasoulinezhad	2003	Tehran	164	Cross-sectional	0.08/5	Low
2	G.pourmand	2006	Tehran	179	Cross-sectional	0.06	Low
3	Alimagham	2002	Tehran	278	Cross-sectional	0.16/5	Low
4	Tabatabaei	2010	Isfahan	130	Cross-sectional	0.04/6	Low

Meta-analysis prevalence of pulmonary infection in renal Transplantation in Iran ;

Based on the results of random effects model, the Prevalence of pulmonary infection in Iranian renal transplant recipients in 751 patients was 8.1% (95% confidence interval [CI]: 6.2, 10).

Table2: Prevalence of pulmonary infection in Iranian renal transplant recipients

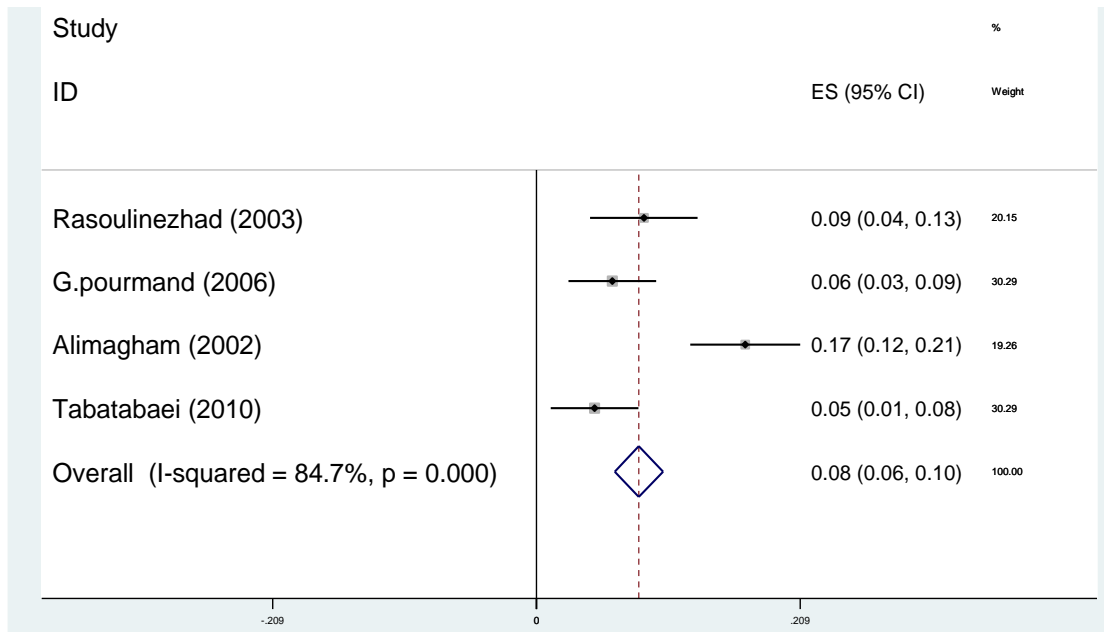| Study	year	ES	95% conf Interval		weight
			low	up	
Rasoulinezhad	2003	0.085	0.042	0.128	20.15
G.pourmand	2006	0.060	0.025	0.095	30.29
Alimagham	2002	0.165	0.121	0.209	19.26
Tabatabaei	2010	0.046	0.011	0.081	30.29
Pooled ES	-------	0.081	0.062	0.100	100

Fig.2 . The Prevalence of pulmonary infection in Iranian renal 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.

Discussion and Conclusion

During the past 15 years, there has been groundbreaking progress regarding dialysis and renal transplantation. The contemporary knowledge indicates that renal transplantations now involve a better life quality and dramatic decreases in complications and mortality resulted from the last stage of kidney disease. Renal transplantation is now the most economic strategy for patients suffering from kidney failure. A study was conducted to determine the prevalence of pulmonary infections among patients who had undergone renal transplantation. So, 4 stages of study were defined involving 751 people for the final step. The overall prevalence of pulmonary infection in renal transplantation patients was 8.1 percent. This percentage was gained from a comprehensive study of the available evidence (Iran is a country in the Middle East with a population of 80 million people).

Limitations

One of the limitations of the present study is the small number of studies conducted on the Prevalence of pulmonary infection in Iranian renal transplant recipients. However, as long as the present researchers can claim, the present principled revision and statistical analysis has been the first attempt to evaluate Prevalence of pulmonary infection in Iranian renal transplant recipients. Another limitation of this study is the inclusion of only 2 provinces out of 31 provinces of Iran, a fact which makes it difficult to generalize the results. Although investigators kept cautious of writers, institutes, journals and other related information, two independent reviewers supervised the selection of related papers and the third reviewer solved all the and possible disagreements.

Strengths

The researchers can claim that this study is the first systematic review conducted to determine the Prevalence of pulmonary infection in Iranian renal transplant recipients. The present study was conducted on the basis of a systematic review plan and all databases were searched. Population-based studies were also applied to the final research.

Conclusion

Since 8.1 percent of renal transplantation patients suffer from pneumonia and regarding the effect of pneumonia in mortality, we need to be aware of its clinical symptoms, types of organisms, and rapid diagnosis and treatment of this disease. Generally, this paper aims to represent the role of these infections in pathogenicity and mortality. Hence, it is recommended to identify risky patients in the time of transplantation using serologic tests and to do their follow-up tests with more scrutiny. Also, it is suggested that all infections be cured before the operation. Finally, in case of acute infections, empirical treatment needs to be initiated before the lab results are prepared.

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