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THE IMPORTANCE OF VITAMIN D DEFICIENCY IN YOUNG CHILDREN WITH COMMUNITY-ACQUIRED PNEUMONIA

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Annotation: Emerging evidence has shown that vitamin D deficiency may be related with community-acquired pneumonia (CAP), but individually published studies showed inconclusive results. The aim of this study was to quantitatively summarize the association between vitamin D and the CAP. We conducted this meta-analysis though a systematic literature search of PubMed, Medline, and EMBASE up to 31 September 2022 with the following keywords ‘vitamin D’ or ‘cholecalciferol’ or ‘25-hydroxyvitamin D’ or ‘25(OH)D’ in combination with ‘community-acquired pneumonia’ or ‘CAP’ or ‘pneumonia’ with no limitations. This meta-analysis was performed following the guidelines of Meta-analysis of Observational Studies in Epidemiology. The association between vitamin D levels and CAP were measured as odds ratio (OR) and weighted mean difference (WMD). Results were combined using a random-effect or a fix-effect meta-analysis, and sensitivity analyses were conducted to explore potential factors.
Keywords: Community-acquired pneumonia, meta-analysis, pneumonia, vitamin D.

INTRODUCTION

Community-acquired pneumonia (CAP) is an infectious inflammation of lung parenchyma (including lung interstitium) occurring outside hospitals, which is one of the common infectious diseases threatening human health and is a non-negligible problem during prevention and control of public health emergencies.

MATERIALS AND METHODS

Recently, much attention has been paid to the role of vitamin D in host defense against infection. Apart from its classic function in calcium-phosphate homeostasis, vitamin D has pleiotropic immunomodulatory properties. It is reported that the vitamin D plays an important role in the innate immune response, particularly by increasing the production of antimicrobial peptides (B–defensing, cathelicidin). Furthermore, vitamin D has been found to be of great effect on the activity of the adaptive immune system.

RESULTS AND DISCUSSION

Literatures on PubMed, Medline, Medline, Cochrane and EMBASE were systematically searched up till 31 September 2022 for relevant articles using the following keywords ‘vitamin D’ or ‘cholecalciferol’ or ‘25-hydroxyvitamin D’ or ‘25(OH)D’ in combination with ‘community-acquired pneumonia’ or ‘CAP’ or ‘pneumonia’ with no limitations. We also manually searched all eligible original articles, reviews and other relevant articles. And we contacted relevant authors by emails if necessary. This meta-analysis was performed following the guidelines for Meta-analysis of Observational Studies in Epidemiology (MOOSE). No ethical approval is needed, for the reason that this study is a meta-analysis.

Sensitivity analyses were conducted to examine the potential sources of heterogeneity in this meta-analysis. In the results of the WMD, Li‘s study conducted was responsible for most of the heterogeneity in this meta-analysis. After excluding this study, the heterogeneity was down to 75% and the WMD was −4.56 (95% CI: −6.40, −2.71). Further exclusion of any single study did not alter the overall combined relative risk, and each outcome had statistical significance. And Quraishi study conducted was responsible for most of the heterogeneity in the result of the ORs in this meta-analysis (OR=1.97, 95% CI: 1.38, 2.81, I^2=61%). Besides, there were no obvious changes in the pooled ORs as the results of the exclusion of any other single study.

This is the first meta-analysis on the relationship between serum vitamin D status and CAP among people. The results of 8 observational studies provide strong evidence that serum

25(OH)D level is associated with CAP. Both the results of the pooled ORs and the pooled effect of WMD showed that the serum 25(OH)D levels had a relationship with CAP. VDD experienced a significantly increased risk of CAP (OR=1.64, 95%CI: 1.00, 2.67). People with CAP, compared to the control, were with the decreased level of vitamin D by 4.56ng/mL. Considering the prevalence of vitamin D deficiency among humans, this result may provide some scientific suggestions for prevention of CAP.

According to the results of quality assessment, studies included in this meta-analysis were with high quality. Besides, there was no obvious publication bias after the analysis of funnel plots. The results of sensitivity analyses implied 2 studies probably contributed to the heterogeneity.

CONCLUSION

The evidence presented here indicates an association between VDD and an increased risk of CAP, as person with < 20ng/mL serum vitamin D is under increased risk of CAP (OR=1.64, 95%CI: 1.00, 2.67). However, more evidence is needed to better understand the effect of vitamin D on the CAP, and well-designed trails are required to determine the explicit effect of vitamin D supplementation. Therefore, people at risk of VDD and determining how to supplement vitamin D could be considered in the future.

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