

Therapeutic effects of statins drugs use and continuous nursing on patients with chronic obstructive pulmonary disease and the influence of life quality

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Abstract: Chronic obstructive pulmonary disease (COPD) is able to be treated and delayed. Many interventions include smoking cessation and daily maintenance of drug therapy. In clinical practice, although respiratory physicians have given optimal drug treatment to patients, there is no treatment for etiological factors in these treatments, and they have little effect on the long-term prognosis of COPD. Therefore, this paper puts forward a method of continuing care. Through Meta analysis of the therapeutic effects of statins, it is shown that statins have a positive impact on the treatment of chronic obstructive pulmonary disease. On the other hand, the study shows that continuing care can reduce the SGRQ (St George's respiratory questionnaire) score of the patient, thereby improving the patient's quality of life. Therefore, both drug therapy and continuing care are effective methods for the treatment of chronic obstructive pulmonary disease, which can be effectively combined.

Keywords: Statins, chronic obstructive pulmonary disease, anti-inflammatory effect, continuous nursing.

INTRODUCTION

Chronic obstructive pulmonary disease (COPD) is based on the airflow limitation is not fully reversible, progressive development of the main features of a chronic airway disease, the high incidence rate, high disability rate, high mortality rate and brings heavy economic burden to the healthcare system (Altorki *et al.*, 2016; Bergmann *et al.*, 2016). Chronic obstructive pulmonary disease can be treated or delayed, many interventions including smoking, daily medication, drug therapy, acute exacerbation period of follow-up, patient education, pulmonary rehabilitation after discharge, some influenza vaccination and long-term home oxygen therapy and so on, can be used for the treatment and management of patients with chronic obstructive pulmonary disease (Cahill *et al.*, 2015). The current drug treatment for chronic obstructive pulmonary disease includes various bronchodilators, glucocorticoids and expectorants, which have different mechanisms of action (Dindo *et al.*, 2014). The goals of these therapies are to improve symptoms, improve ventilation function indicators, improve health-related quality of life, reduce the frequency of exacerbation of COPD, and increase the number of emergency and hospitalization and further reduce the consumption of medical resources (Fang *et al.*, 2017). It is worth noting that, in clinical practice, although respiratory physicians have given patients optimal drug therapy, and brought after a large randomized study demonstrates the benefits of a series, including the improvement of pulmonary function, improve the quality of life, reduce

the frequency of acute exacerbation of chronic obstructive pulmonary disease, but the treatment of no treatment for the cause the smaller and affect the long-term prognosis of COPD. In patients with chronic obstructive pulmonary disease, we observed a progressive inflammatory system based on experiments, this may be a new trend for the future study of drug therapy (Chen *et al.*, 2009). At present, in the hospital after the acute treatment, most patients can only back to the hospital to continue treatment and rehabilitation for referral information related to health, in a timely manner to meet the needs of hard to get (Hu, 2013; Ghoneum *et al.*, 2015). Continuous care after discharge can extend patient centered services to patients' families, and establish a one to one interaction among nurses, patients and family members through telephone, e-mail and family visits, so as to promote and maintain patient health.

The progression of chronic obstructive pulmonary disease is highly related to these inflammatory processes, and the disease progresses to chronic bronchitis and emphysema (Li *et al.*, 2015). In addition to local inflammation of the lung, systemic inflammation is also common in patients with chronic obstructive pulmonary disease (Liu *et al.*, 2016). Statins are widely used in the treatment of hyperlipidemia, but in recent years, studies have shown that statins have anti-inflammatory, anti-oxidation and immunomodulatory effects (Ostojic *et al.*, 2015). Some randomized controlled trials evaluated the effects of statins on endothelial function and inflammatory markers, including hs-CRP, IL-6, IL-10, IL-17A and IL-22. The results showed that statins might reduce these inflammatory markers. Some researchers put forward the

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hypothesis that statins play a potential role in the treatment of chronic obstructive pulmonary disease (Mellotte *et al.*, 2015), and implemented a large sample cohort study, but the research methods and conclusions were different. Therefore, the purpose of this systematic review and meta analysis is to collect current cohort studies on the application of statins in chronic obstructive pulmonary disease, and to evaluate the effect of statins on the prognosis of patients with chronic obstructive pulmonary disease. This paper summarizes the status of statins in chronic obstructive pulmonary disease, and provides some reference for future research.

MATERIALS AND METHODS

Meta analysis

The object of study including the patients that accord with the global initiative for chronic obstructive pulmonary disease (GOLD) diagnostic criteria. It is also possible to identify patients with chronic obstructive pulmonary disease based on the patient's electronic medical records and database records. The age is not limited. Only patients with chronic obstructive pulmonary disease can not be included in the study of patients with other airway diseases.

The study is a cohort study of statins used in chronic obstructive pulmonary disease (COPD), which is not restricted by regional, language and publication types. The control group was not treated with statins. The exposure group was used or currently in the use of statins. If any of the following documents meet the standard, will be excluded: (1) Review, experiments and comments; (2) Republished literature not all included, we can only be included in the data that one of the most comprehensive study; (3) The original research data cannot be obtained, contact the author can obtain useful data, this the situation is not included in the meeting; (4) The need to retrieve later, no relevant studies published, if not published, as far as possible to contact the authors to obtain relevant data, such as the last cannot obtain the relevant data, should be excluded; (5) The lack of control group.

Retrieval words and retrieval strategies

The search term included statins, chronic obstructive pulmonary disease, cohort study and COPD. The use of appropriate wildcards, the use of key words and key words to search, English retrieval words can be properly spelled changes. The database includes PubMed, Embase, The Cochrane Library, Web of Science, Chinese biomedical literature database CBM and Chinese academic journal full text database CNKI. First, read the headlines and summaries. If the researchers believe that they may meet our inclusion criteria, we will retrieve the full text for full text review, and meet the inclusion criteria before being included in the systematic reviews. If there are differences, consult third parties to help judge. If the relevant data of some research can not meet the

requirements of meta analysis, we should try our best to contact the author to fill the gap.

The extraction of data is extracted by the standard data extraction table made in advance. The main contents of each study include: (1) First, the data related to the basic information included in the research, including the name and code, the name of the first author, the age of publication, the country or region of the Research Institute, etc. (2) The key elements of research design and quality evaluation were follow up and loss of visits, confounding factors, etc. (3) The basic situation of the patients in the exposure group and the control group, including the number of cases, the sex ratio, the age and so on. (4) Outcome index, relative risk degree after multi factor correction, ratio and corresponding confidence interval.

Analysis of nursing intervention

At the same time, in order to study the nursing of patients with chronic obstructive pulmonary disease, at the same time, we selected 100 cases in our hospital in 2015 were treated patients with chronic obstructive pulmonary disease, all patients are in line with the "clinical diagnostic criteria for COPD diagnosis and treatment guidelines" in COPD, in the period of stability, life can take care of themselves, can accept telephone follow-up and with the patients signed informed consent. All patients were randomly divided into the control group and the experimental group, 50 cases in each group. There was no statistically significant difference in the general data between the two groups in terms of gender and age ($P > 0.05$). The patients in the control group were treated with routine nursing intervention, such as health education, basic nursing, medication nursing, psychological nursing, discharge guidance and so on. The patients in the experimental group adopted the continuation nursing on the basis of routine nursing, and the specific contents of the nursing intervention were as follows: (1) Establishment of COPD continuing nursing team: team members including 1 nurse work is mainly responsible for the leadership of the group and continue working for team training; each member of the COPD related knowledge and nursing skills, let team members can effectively master the nursing skills related. (2) Develop a perfect continuous care plan: first 1 weeks before discharge, we first need to measure the body mass index of patients, and conduct GHQ-12 and SGRQ score survey. We will conduct a comprehensive assessment of patients' psychological, physiological, environmental, social and health behaviors. After discharge, patients should be followed up. After third weeks of discharge, patients should be followed up. After 3 months of discharge, body mass index, GHQ-12 and SGRQ scores were investigated. (3) Predischage guidance: 1 weeks before discharge to respond to patients with targeted discharge guidance. Nurses should enhance

communication with patients, understand the psychological status of patients, care and support, solve the difficulties of patients, introduce successful cases to patients, and improve their confidence. (4) Follow up: after 3 weeks of discharge, patients should be followed up. The family environment, rehabilitation training effect and implementation status were observed and on-site guidance for patients was carried out, and abdominal breathing training for patients was evaluated.

STATISTICAL ANALYSIS

We used STATA software for all statistical analysis. The specific process of Meta analysis includes: Heterogeneity test and effect model selection. In this study, the Odds ratio (OR) was selected as the combined effect, and the hypothesis test was carried out to determine whether the amount of the combined effect was statistically significant. If $p < 0.05$, it is considered that the amount of combined effect is statistically significant; if $p > 0.05$, it is considered that the amount of the merger effect is not statistically significant.

RESULTS

Literature retrieval results

The results of literature retrieval were searched through PubMed, Embase, Web of Science, CBM, CNKI and other Chinese and English databases. Initially, 514 articles were screened out. After 109 duplicate documents were excluded, 405 articles were retained. In these articles, we excluded articles that did not meet the inclusion criteria according to the titles and abstracts of the reading articles, and got 62 articles that might meet the inclusion criteria. After careful reading of the full text of these 38 articles, after screening by layer by layer, 20 papers are finally included in the meta analysis and systematic evaluation.

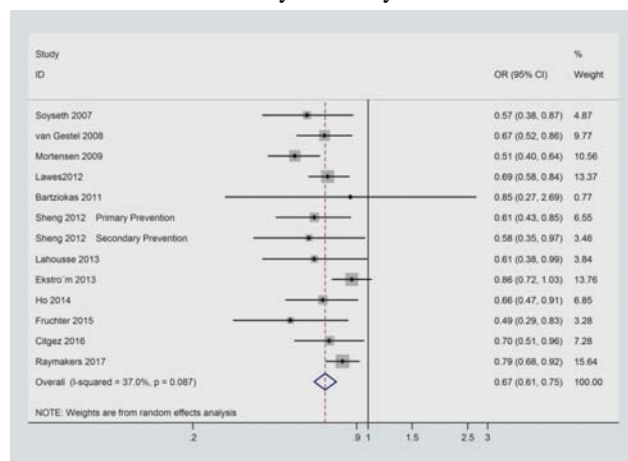


Fig. 1: The All-cause mortality after the use of statins in patients with COPD.

Meta analysis results

A total of 13 cohort studies in 14 articles reported total

cause mortality after the use of statins in patients with chronic obstructive pulmonary disease. 10 studies showed that statins reduced the all-cause mortality in patients with chronic obstructive pulmonary disease and the remaining 3 studies showed no correlation between statins and all-cause mortality. The random effect model of meta analysis results show that the combined OR value was 0.65, 95% confidence interval (0.65-0.78), $P < 0.0001$, the difference was statistically significant, the risk of death in patients with chronic obstructive pulmonary disease with statins is no use of statins in patients with 0.65 times, the heterogeneity of acceptable (I-squared=37.0%, $P = 0.087$) (fig. 1).

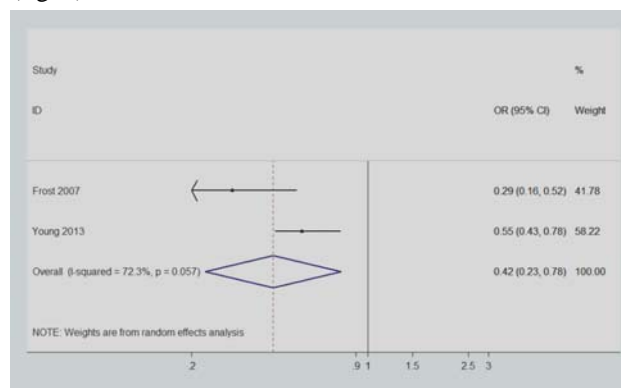


Fig. 2: The risk of COPD death after the use of statins.

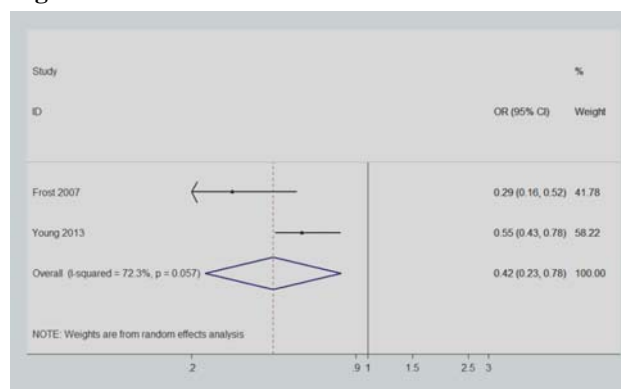


Fig. 3: Risk of death of cardiovascular events.

COPD mortality

A total of 2 cohort studies reported the COPD mortality after the use of statins in patients with chronic obstructive pulmonary disease (COPD). The random effect model of meta analysis results showed that the combined OR value was 0.43, 95% confidence interval (0.20-0.80), $p = 0.0057$, the difference was statistically significant, compared with no use of statins in patients with chronic obstructive pulmonary disease, reduce COPD related mortality using statins in patients with chronic obstructive pulmonary disease. See fig. 2 of the forest map.

Mortality of cardiovascular events

A total of 3 cohort studies reported the mortality of cardiovascular events in patients with chronic obstructive pulmonary disease (COPD) after the use of statins. The

random effect model of meta analysis results showed that the combined OR value was 0.53, 95% confidence interval (0.34-0.90), $p=0.288$, the difference was statistically significant, compared with no use of statins in patients with chronic obstructive pulmonary disease, reduce the use of statins in patients with chronic obstructive pulmonary disease COPD cardiovascular mortality. The forest map is shown in fig. 3.

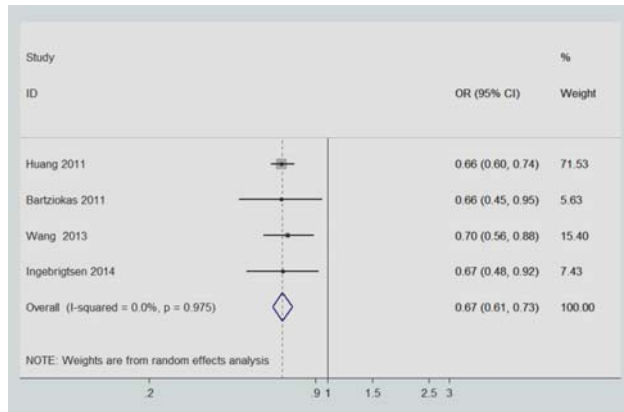


Fig. 4: Meta analysis of acute exacerbation risk of COPD.

Acute exacerbation of chronic obstructive pulmonary disease

A total of 4 cohort studies have reported an acute exacerbation of the use of statins in patients with chronic obstructive pulmonary disease. The random effect model of meta analysis results showed that the combined OR value was 0.59, 95% confidence interval (0.45-0.78), $p<0.0001$, the difference was statistically significant, compared with no use of statins in patients with chronic obstructive pulmonary disease, use of statins in patients with chronic obstructive pulmonary disease in acute exacerbation of COPD risk reduction. The forest map is shown in fig. 4.

Results of nursing intervention

The body mass index and GHQ-12 (General Health Questionnaire) scores in the experimental group were significantly better than those in the control group. The difference between the two groups was statistically significant ($P<0.05$) (table 1). After nursing intervention, the scores of St. George's Respiratory Questionnaire (SGRQ) in the experimental group were significantly better than those in the control group, the difference between them was statistically significant ($P<0.05$) (table 2).

DISCUSSION

Statins are widely used in the treatment of hyperlipidemia and can be used for primary and secondary prevention of cardiovascular diseases. In this systematic review and meta analysis, we found a significant statistical significance between statin therapy and COPD outcome.

Compared with COPD patients without statin therapy, the risk of all-cause death in COPD patients with statins decreased 33% (Paccez *et al.*, 2014). There were several reasons for the positive effects of statin therapy on the prognosis of chronic obstructive pulmonary disease. First, it may be the potential beneficial effects of statins on cardiovascular complications in chronic obstructive pulmonary disease. Smoking is a pathogenic factor in most patients with chronic obstructive pulmonary disease, and is also a cause of cardiovascular disease (Qin *et al.*, 2015). Therefore, patients with chronic obstructive pulmonary disease often have cardiovascular disease, and cardiovascular disease is also the main cause of chronic obstructive pulmonary disease (Wu *et al.*, 2014). The prognosis of chronic obstructive pulmonary disease patients with cardiovascular disease is poor, and the short-term and long-term survival rate is significantly lower. Studies have shown that statins can reduce the risk of cardiovascular disease by lowering cholesterol levels. Therefore, statin therapy can improve the prognosis of chronic obstructive pulmonary disease and reduce all-cause mortality by reducing the incidence of cardiovascular events (Tang *et al.*, 2017). In a retrospective cohort study included in this systematic review and meta analysis, some studies included patients with chronic obstructive pulmonary disease with cardiovascular disease.

Second, the use of statins can reduce the potential systemic inflammation. Studies have shown that the progression of chronic obstructive pulmonary disease is related to systemic inflammation (Tural *et al.*, 2015) and can lead to acute exacerbation of chronic obstructive pulmonary disease and increase the mortality of patients with chronic obstructive pulmonary disease (Sheng *et al.*, 2015). Systemic inflammation has a negative effect on the prognosis of chronic obstructive pulmonary disease. Statins have anti-inflammatory and immunomodulatory effects (Tang *et al.*, 2017), which may improve the prognosis of patients with chronic obstructive pulmonary disease through reducing the inflammatory process (Wu *et al.*, 2015). Human and animal studies have shown that statins have an impact on lung inflammation and systemic inflammation. The study found that statins have the ability to reduce the level of inflammatory markers. Some randomized controlled trials evaluated the effects of statins on endothelial function and inflammatory markers, including hs-CRP, IL-6, IL-10, IL-17A and IL-22. The results showed that statins might reduce these inflammatory markers. Third. Statins have the effect of antioxidant stress. Studies have shown that increased production of oxygen free radicals can induce neutrophil release protease, destroy lung elastic fibers, induce emphysema formation, and oxidative stress is the main pathogenesis of chronic obstructive pulmonary disease (Xuan, 2015). Statins can reduce oxidative stress and scavenge oxygen free radicals by inhibiting the activity of

Table 1: Body mass index and GHQ-12 score after nursing intervention

Group	Cases	Body mass index (kg/ m2)	GHQ-12 score
Experience group	50	18.5±2.3	12.3±1.1
Control group	50	17.3±1.9	13.5±2.0
T value		2.489	4.763

Table 2: Comparison of SGRQ scores after nursing intervention

Group	Cases	Disease impact	Limited activity	总评分
Experience group	50	23.5±12.6	45.1±15.7	31.6±11.8
Control group	50	35.4±10.9	57.2±17.3	42.1±10.9
T value		3.268	2.471	4.410

reduced nicotinamide adenine dinucleotide phosphoric acid and increasing the level of nitric oxide, so as to protect lung. In addition, statins can reduce protease production through its antioxidant stress, and to some extent correct the protease / protease imbalance.

For the clinical nursing work of COPD patients, the experimental group in this study was given continuous nursing after discharge. The clinical nurses repeated and personalized health education and guidance for patients, so that patients could better understand COPD (Zhu *et al.*, 2015). At the same time, by improving the self-care ability of patients; nursing staff through follow-up to rehabilitation of patients were carefully observed, to adhere to the rehabilitation of patients after discharge instruction effectively, and can effectively improve the pulmonary function of patients, to improve the quality of life of patients (Pacez *et al.*, 2014). Results after nursing intervention effect, patients' symptoms, activity limitation and total scores were significantly better than the control group, the difference was statistically significant ($P < 0.05$); the results show continuing nursing can make the patients with the SGRQ score decreased, so that the patients' quality of life. Clinical studies found that COPD patients will have various negative emotions under the influence of disease, which will aggravate the patient's condition and influence the effect of rehabilitation training and ultimately reduce the quality of life of patients. In continuing care, patients are followed up and followed up by telephone, allowing patients to master the way to relax their emotions and effective counseling, comfort and encouragement for patients, so that patients' bad mood can be effectively relieved and good confidence is established.

CONCLUSION

Our systematic review and meta analysis show that the use of statins may be related to all-cause mortality, cardiovascular mortality, COPD mortality and COPD deterioration risk. This may be related to the anti-inflammatory and immunomodulatory effects of statins. These conclusions require large, well designed

randomized controlled trials to verify. To explore the specific mechanisms of statins play a role in patients with chronic obstructive pulmonary disease in clinical research needs in the future and discuss the safety of statins in elderly patients with chronic obstructive pulmonary disease in the patients with chronic obstructive pulmonary disease in which the phenotype of patients will benefit from statin, statin and with other drugs or treatment methods combined to create synergies can be our future research direction.

ACKNOWLEDGEMENTS

Authors are thankful to The Second Hospital of Dalian Medical University for providing the equipment.

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