Analysis of Low Carbohydrate High Fat Formula on Length of Days of Hospitalization for Confirmed Covid-19 Patients with Pneumonia at RSMH Palembang in 2021

Septa Clara Astiyah[1*], Sri Hartati[1], Mulaiha[1]

[1] Nutritional Unit Service Dr. Mohammad Hoesin General Hospital Palembang

A R T I C L E   I N F O

A B S T R A C T

Analysis of RKTL Formula Feeding toward the Length of Stay (LOS) for COVID-19 Confirmed Patients with Pneumonia as Comorbidity. COVID-19 is one of the latest respiratory virus as known as SARS-CoV-2 which caused acute respiratory syndrome and can lead to death. Pneumonia occurs as one of the COVID-19 comorbidities that occurs at day 5-6 to day 14, indicated by infection and fever which progressively weaken respiratory and immunity system. One of the nutritional therapy for COVID-19 confirmed patients with pneumonia as comorbidity is RKTL (Rendah Karbohidrat Tinggi Lemak) formula which can accelerate recovery, increase O2 level, and decreasing CO2 production so that it will reduce the length of stay (LOS). The aim of the study was to analyze the effect of RKTL formula diet toward LOS for COVID-19 patients with pneumonia as comorbidity. This was a true-experimental study with parallel design clinical trial in COVID-19 isolation ward at RSMH Palembang during May-August 2021. The collected data was primary data consists of before and after intervention as long as the subjects being hospitalized then analyzed univariate to find out the distribution of frequency presented by simple boxplot graph. The study reported that there were differences in average for the LOS among three subject group. The control group has 11 days for the Average Length of Stay (ALOS), where case group XI whom given RKTL formula feeding 1x/day had the Average Length of Stay (ALOS) for 10 days and case group X2 whom given RKTL formula feeding 3x/day had the Average Length of Stay (ALOS) for 7 days. It can be concluded that there was an effect of RKTL formula diet toward the Length of Stay (LOS) for COVID-19 confirmed patients with pneumonia as comorbidity.

1. Introduction

The world is currently facing a major pandemic of the corona virus disease that emerged at the end of 2019 and is spreading throughout the world rapidly. The first corona virus attack was reported was in Wuhan City, Hubei Province, China on December 31, 2019 and WHO reported this case as pneumonia of unknown etiology. On January 7, 2020, China identified this disease as "corona virus disease/COVID-19" which is caused by a new corona virus derivative; 'CO' is taken from corona, 'VI' is from virus, and 'D' is disease.[1]

Stachowska, et all reported that on March 25, 2020, there were 414,179 confirmed cases of COVID-19 with 18,440 deaths (CFR 4.4%) in 192 countries or regions, and among them health workers were also infected. Ahmad (2019) stated that in Indonesia on March 2, 2020, there were initial findings of 2 confirmed cases and in March 25, 2020, 790 confirmed cases were reported from 24 provinces.[2]

In South Sumatra on March 24, 2020, the first case was reported with no. 01 confirmed dead patients and no. 02 confirmed from the city of Prabumulih. There were 2,321 people confirmed cases at RSUP Dr. Mohammad Hoesin (RSMH) Palembang, from March 2020 to February 2021.

Confirmed cases with comorbidities were 996 people (42.9%) and dead patients were 176 people (7.58%). COVID-19 confirmed patients with pneumonia, mild-moderate degrees were 287 people (28.8%). The peak of confirmed cases of COVID-19 with pneumonia can be seen in figure 1.[3]
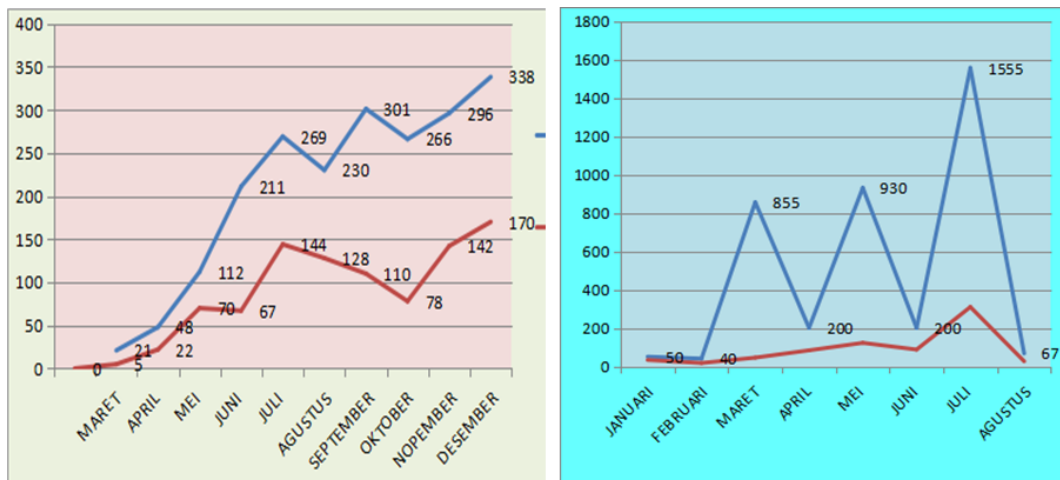

Figure 1. Number of confirmed COVID-19 patients (--) with comorbid pneumonia (---) in 2020 and 2021

Bregman, et al wrote that pneumonia is an advanced condition of chronic obstructive pulmonary disease (COPD) with infection and fever. Pneumonia attacks the lungs progressively, weakening the function of the respiratory system, causing shortness of breath and lowering immunity.[4] Ahmad stated that the incubation period for the COVID-19 virus from entering the respiratory tract (close contact) until showing clinical symptoms is 5-6 days to 14 days. Based on the 2020 medical record report, it is known that the average length of stay in the hospital for confirmed COVID-19 patients with pneumonia is 15 days.[3]

Budiningsari and Hadi mention nutritional therapy as a support for health services in hospitals was aimed to accelerate healing and reducing the length of hospitalization. Many factors affect the length of the patient's stay, such as: nutritional therapy, age, gender, disease complications, wound infection, pain, anxiety and levels of albumin, hemoglobin, platelets, leukocytes, and hematocrit.[5]

Patients with confirmed COVID-19 at RSMH Palembang were given a high calorie high protein diet (TKTP) formula of 2600 Calories (Cal) which was given in the form of 3x main meals and 2x snacks as well as an extra TKTP formula of 1x200 cc given at breakfast and drinking water as much as 2000 cc/day. Sabour Faramawy, et al stated that the administration of the low carbohydrate high fat (RKTL) formula will accelerate healing, increase O2 and reduce CO2 in the body's metabolism in patients with respiratory disorders. Nutritional formulas with high fat will produce less carbon dioxide (CO_2) therefore, it enlarges the respiratory tract compared to nutritional formulas with high carbohydrates so that it can reduce the length of hospitalization.[6]

High-fat formulas are the most efficient ways of providing low-volume, calorie-dense nutrition for COPD patients and most beneficial for patients on prolonged mechanical ventilation with hypercapnia and malnutrition. Further research is needed to investigate the optimal nutritional formula in patients with respiratory disorders according to the

severity or complications of the disease, especially for patients with confirmed COVID-19.[6]

Based on this description, there has been no research on the provision of nutritional therapy to patients with confirmed COVID-19 in hospitals, therefore, it is necessary to conduct research on the administration of the TKTP Diet 2600 Cal extra RKTL formula toward the length of stay of confirmed patients with COVID-19 with comorbid pneumonia.

2. Methods

This study is a true experiment with a parallel clinical trial design on patients confirmed COVID-19 with pneumonia who were given Diet TKTP 2600 Cal + RKTL in the COVID-19 isolation room at RSMH Palembang from May-August 2021. Subjects were selected by purposive sampling and divided into three groups, namely: a control group (Diet TKTP 2600 Cal) and two groups of cases namely X1; consisting of Diet TKTP 2600 Cal + RKTL 1x200 cc, and X2; which is consisting of Diet TKTP 2600 Cal + RKTL 3x200 cc).

The research subjects were divided into 3 groups to find out which group had been the most influenced by the length of stay. Supply of nutrition is one of the efforts that can increase the immunity of research subjects so that the length of hospitalization can be shortened. The composition of dry formula in the hospital using the ratio of KH: Protein: Fat = 60%: 20%: 20%. While the RKTL formula which was given in the study used the ratio of KH: Protein: Fat = 50%: 20%: 30%. The aim of this treatment is to reduce complaints of shortness of breath in patients with confirmed COVID-19, especially those with comorbid pneumonia.

The number of subjects of each group is consisting of 10 subjects who met the inclusion criteria (positive PCR swab, male/female, age 18-59 years, comorbid pneumonia, general condition mild-moderate degree, able to communicate via whatsapp/phone/intercom) and exclusion criteria (died, resigned, was diagnosed with another disease, consumed food from outside the hospital).

The primary data of the control group and case group, which were carried out before and after treatment while the subject is being treated were taken. The data is analyzed to determine the frequency of distribution and presented in the form of a simple boxplot graph (figure 3).

3. Results

Nutritional therapy for confirmed COVID-19 patients with pneumonia at RSMH Palembang was given a 2600 Cal TKTP Diet (250 gr rice, 50 gr vegetable, 100 gr animal meat, 100 gr vegetable, 100 gr fruit) using a 10-day menu cycle. The process of making the diet is carried out at the Nutrition Installation, where 50 grams of RKTL formula is dissolved in 200 cc of warm water so that it contains 200 Cal per serving. This formula is then packaged and labelled before being presented to the subject. The diet given to the control group was Diet TKTP 2600 Cal, in the case group (X1) was Diet TKTP 2600 Cal plus RKTL formula 1x200 cc, and in the case group (X2) was Diet TKTP 2600 Cal plus RKTL formula 3x200 cc.

The number of population and sample size, based on the existing research flow, can be seen from figure 2.
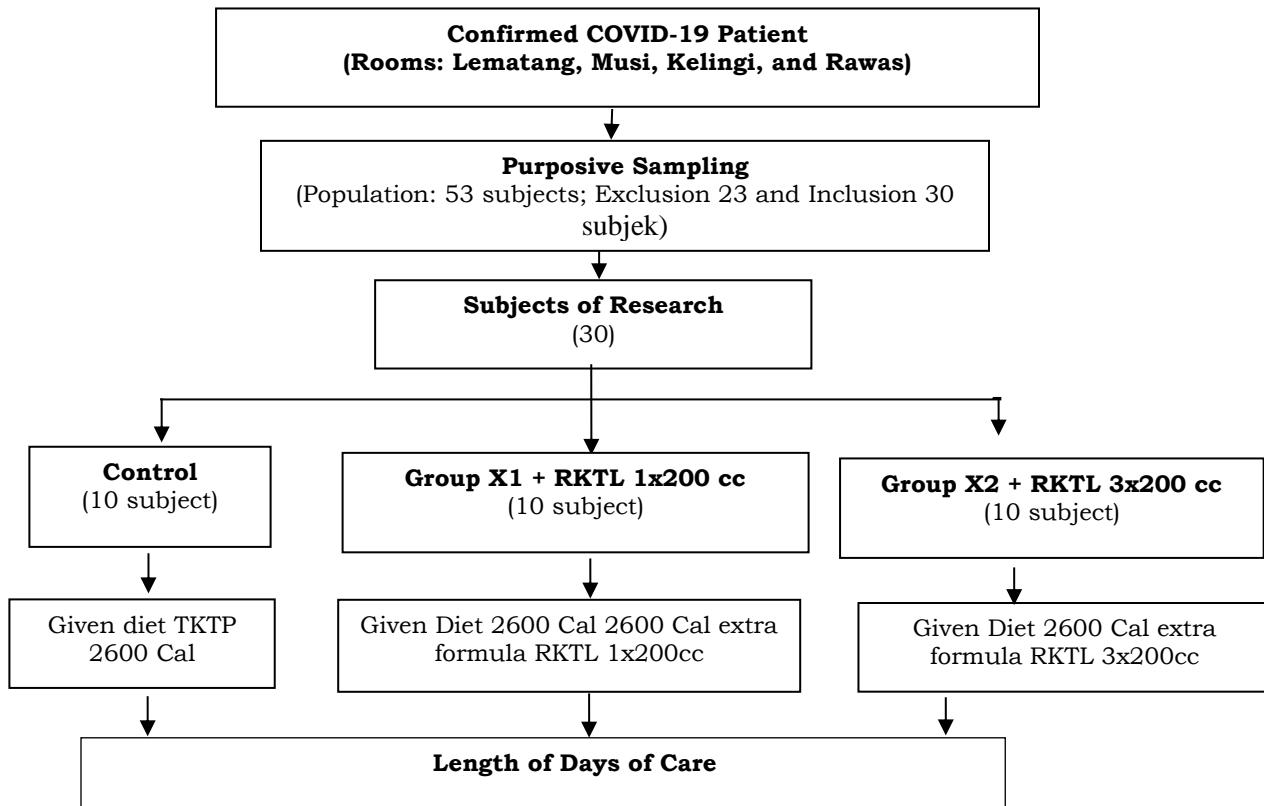
Figure 2. Population and research sample size

Univariate analysis was performed to determine characteristics of subjects.
a. Gender

Table. 1 Distribution of subjects by gender

Gender	Group					
	Control		Case X1		Case X2	
	n	%	N	%	N	%
Male	5	50	2	20	5	50
Female	5	50	8	80	5	50
Total	10	100	10	100	10	100

Table 1 shows that in the three groups, the gender of the subjects varied. In the control group and case group X2, the number of male and female subjects was equal (50%), while in the case group X1 most of the subjects were female (80%).

b. Ages

Table. 2 Distribution of Subjects by Age

Ages	Group					
	Control		Case X1		CaseX2	
	N	%	N	%	N	%
18 – 38 years	6	60	5	50	3	30
39 – 59 years	4	40	5	50	7	70
Total	10	100	10	100	10	100

Table 2 shows the distribution of subjects based on age in the control group with a greater age range of 18-38 years (60%). Meanwhile, in the X1 case group, both age ranges had the same age distribution (50%). In the case group X2, it is known that the age range of 39-59 years is more (70%).

c. Length of days of care

Table 3. Distribution of subjects based on length of days of hospitalization

Length of Treatment	Groups					
	Control		Case X1		Case X2	
	N	%	n	%	N	%
≤ 10 days	5	50	5	50	10	100
≥ 11 days	5	50	5	50	0	0
Total	10	100	10	100	10	100

Table 3 shows the average length of stay for the control group and the case group X1 with the same distribution, namely the average length of stay of less than 10 days is 50% and the average length of stay of more than 11 days is also 50%, while the average length of stay in the case group X2 100% more than 10 days.
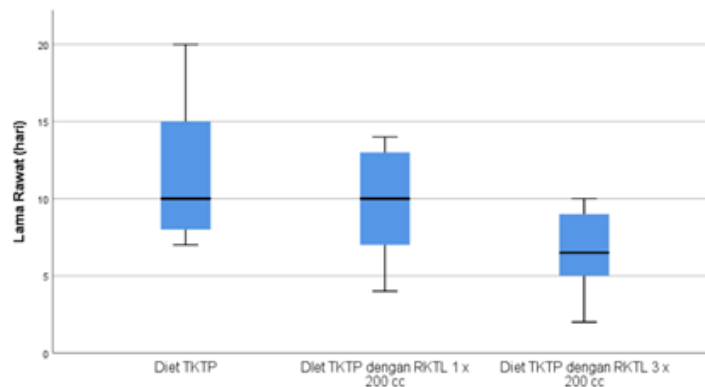

Figure 3. Simple boxplot research subject group

4. Discussion

As can be seen from table 1 that the finding is in accordance with the study of Stachowska, et al which did not mention which gender was more dominant in confirmed COVID-19 patients in the world.[2] Ahmad and Lubis also stated that the COVID-19 virus can attack anyone, both men and women because of the very fast transmission of the COVID-19 virus.[3,7]

The age range of control group was 18-38 years (60%). While, in the X1 case group, both age ranges had the same age distribution (50%; table 2). In the case group X2, the age range of 39-59 years is more (70%). This is in line with the medical record report of RSMH Palembang (2021) that in early 2021, patients with confirmed COVID-19 with pneumonia mostly suffered from the age group under 30 years, while during this study it was known that patients confirmed COVID-19 with pneumonia. mostly experienced by the age group above 40 years. In addition, it was also found that old age is the main cause of death in patients with confirmed COVID-19.[3]

Similar distribution of the average length of stay of the control group and the case group X1 which was less than 10 days is 50% and the average length of stay of more than 11 days is also 50%, while the average length of stay in the case group X2 100% more than 10 days. This is in accordance with the opinion of Budiningsari and Hadi which states that nutritional therapy with the provision of an appropriate diet as a support for health services can accelerate the healing of the patient's illness and shorten the length of stay in the hospital.[5]

Based on the assessment of the frequency distribution in the control group (Dietary TKTP 2600 Cal), case group X1 (Dietary TKTP 2600 Cal + RKTL 1x200cc) and case group X2 (Dietary TKTP 2600 cal + RKTL formula 3x200 cc) showed differences in the length of stay. This is in line with the research by Rakhmadi, *et al* which showed differences in the length of stay between pneumonia patients and non-pneumonic patients.[8]

The control group had a mean of 11 days, a median of 10 days and a mode of 7 days. The length of hospitalization is in the SD value, which is 4 days with the shortest 7 days and the longest being 20 days. In the case group X1, it has a mean of 10 days, a median of 10 days and a mode of 11 days. The length of hospitalization is in the SD value, which is 3 days with the shortest length of hospitalization 4 days and the longest being 14 days. In the case group X2, it has a mean value of 7 days, a median of 7 days and a mode of 6 days. The length of hospitalization is based on the SD value, which is 3 days with the shortest length of stay is 2 days and the longest is 10 days (figure 3).

The difference in mean, median, mode and SD values between the control group, case group X1 and case group X2 showed that there was an effect of giving the RKTL formula on the length of stay for confirmed COVID-19 patients with pneumonia, but the bivariate analysis was not significant because the number of subjects in each group was too large. few (10 subjects) and did not meet the minimum sample size (30 subjects).

The effect of giving the RKTL formula on the length of hospitalization is in accordance with the opinion of M. Schols, et al that nutritional therapy has a positive impact on the incidence of chronic respiratory disease and lung function.[9] Ahmadi, stated that daily consumption of fortified fat correlates with lung inflammation.[10] Schuler states that giving high fat 30-45% of total energy has a low RQ, meaning that the digestive process only requires less oxygen and can prevent hyperglycemia. On the other hand, low carbohydrate intake of 30-35% of total energy can prevent shortness of breath and ketosis.[11] In addition, Hsieh, et al also argue that high-fat supplements will produce lower CO_2 and have a respiratory quotient value, besides being the most efficient way of providing low-volume, calorie-dense supplements for patients with respiratory disorders.[12] Another benefit of giving the RKTL formula was mentioned by Sabour Faramawy, *et al* that a high-fat nutritional regimen can reduce ventilation requirements (reduce shortness of breath) and increase serum ACE concentrations induced by a high-fat diet so that ACE has the potential to reduce the risk of hypertension and cardiovascular disease.[6]

The research has been carried out well, the results of statistical tests show that there are differences in the length of stay in the control group and the case group X1

and case group X2, also showing the effect of giving the RKTL formula on the length of stay of the research subjects. However, this research has limitations when it is ongoing, such as: there is a change in policy on the length of hospitalization that continues to grow during the pandemic and other variables that have not been assessed previously were found. Therefore, it is suggested that the RKTL formula can be used as nutritional therapy in confirmed COVID-19 patients with pneumonia to reduce the length of stay and further research needs to be carried out by considering the addition of the number of subjects and new variables that may be found.

5. Conclusion

There were differences in the length of stay for patients with confirmed COVID-19 with pneumonia in the control group, case group X1 and case group X2 who received the RKTL formula. There is also an effect of giving the RKTL formula on the length of day of stay for confirmed COVID-19 patients with pneumonia. In addition, the average (mean) length of stay for confirmed COVID-19 patients with pneumonia in the control group was 11 days, the case group X1 was 10 days and the case group X2 was 7 days.

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