Study of the Relationship between Vitamin D Level and the Increase in the Severity of Covid-19 Infection in Kirkuk City

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Abstract

The study aimed to find the relation between Covid-19 infection and reduction in vitamin-D levels and with development of severe infection The study was conducted in Kirkuk city during July 2020, included 120 COVID-19 patients who diagnosed by collecting of naso/oropharyngeal swabs and the virus RNA was qualitatively detected by real-Time PCR in Public Health Laboratory according manufacture instruction and WHO protocol. The study also included 30 healthy persons as control group. The study included the collection of blood samples for determination of vitamin-D level (I-chroma, Korea) by direct immunofluorescence technique and according to manufacture instruction. The study also included collection of associated information like age, sex, residence, BMI and by contacting with all patients daily until the 10th day of infection to know their status after treatment. The study showed that, majority of patients were aged from 22 to 41 years of old (P. value <0.001). The study showed that 62.5% of COVID-19 patients were males compared with 37.5% females (P<0.05). The study showed that were asymptomatic, 44.17% of cases of COVID-19 patients were with mild infection and 10% were with severe infection (P<0.001). The study showed a significant relation between Covid-19 infection status with age as the highest mean of age of Covid-19 infected patients was recorded in those who with severe infection**.** The study showed that the lowest mean of serum Vitamin was found in COVID-19 patients comparing with healthy control (12.8±3.6 *v.s.* 29.3±3.1 ng/ml) (P: <0.001). The study also demonstrated that the level of vit. D was significantly reduced in severe infected COVID-19 patients followed by patients with moderate infection and the highest mean was in patients with asymptomatic infection (P<0.001).

Keywords: *Covid-19; Severe infection; PCR; Kirkuk; Vitamin D.*

Introduction

The Covid-19 virus is one of the modern viruses that have spread in our societies since the beginning of 2020 and up to this point [(1)]. The spread of this virus in the community is considered one of the most dangerous viruses on the soul of humans, especially in later ages, and for people with chronic diseases, diabetes, hypertension, acute pneumonia, cancer, and chronic kidney inflammation [(2)]. This virus has spread to all countries of the world, including the Middle East, the Republic of Iraq, especially in the city of Kirkuk and Baghdad, and from the south and the cities of Iraqi Kurdistan [(3)]. Among the most common elements and causes of the spread of this disease is the failure to respond to the laws of the World Health Organization and the Ministry of Health in terms of social distancing, wearing masks, sterilizing feet, surfaces and floors, and avoiding touching, kissing and shaking hands [4)]. Epidemiological studies investigating links between circulating levels of 25-hydroxyvitamin D (25[OH] D; the biomarker of vitamin D status) and incidence and severity of COVID-19 are currently limited in number. Two ecological studies have reported inverse correlations between national estimates of vitamin D status and COVID-19 incidence and mortality in European countries. Lower circulating 25(OH)D concentrations have also been reported to associate with susceptibility to SARS-CoV-2 infection and COVID-19 severity[(5)]. Recently, we have shown that airway diseases are associated with dysregulated vitamin D metabolism raising the possibility that vitamin D deficiency might

arise as a consequence of pulmonary inflammation. Prospective studies can provide insights into the potential for reverse causality, but results from those published to date are conflicting: one retrospective longitudinal study from Israel reported independent associations between low pre-pandemic 25(OH)D levels and subsequent incidence and severity of COVID-19 [6-10]. The study aimed to find the relation between Covid-19 infection and reduction in vitamin-D levels and with development of severe infection

Materials and Method

The study was conducted in Kirkuk city during July 2020, included 120 COVID-19 patients who diagnosed by collecting of naso/oropharyngeal swabs and the virus RNA was qualitatively detected by real-Time PCR in Public Health Laboratory (Sacace Biotechnology, Italy) according manufacture instruction and WHO protocol. The study also included 30 healthy persons as control group. The study included the collection of blood samples for determination of vitamin-D level (I-chroma, Korea) by direct immunofluorescence technique and according to manufacture instruction. The study also included collection of associated information like age, sex, residence, BMI and by contacting with all patients daily until the 10th day of infection to know their status after treatment.

Results

The study showed that, majority of patients were aged from 22 to 41 years of old (P. value <0.001), Table 1.

Table 1: Distribution of studied patients according to characteristics of menstrual cycle

Age (Year)	No.	%
12-21	12	10
22-31	28	23.33
32-41	40	33.33
42-51	20	16.67
52-61	11	9.17
62-71	9	7.5
Total	**120**	**100**

P. value <0.001

The study showed that 62.5% of COVID-19 patients were males compared with 37.5% females (P<0.05), Table 2.

Table 2: Distribution of Covid-19 according to sex

P.value	Positive		Sex
	%	No.	
0.026	62.5	75	Male
	37.5	45	Female
	100	120	Total

The study showed that were asymptomatic, 44.17% of cases of COVID-19 patients were with mild infection and 10% were with severe infection (P<0.001), Table 3.

Table 3: Distribution of Covid-19 according to type of infection

Covid-19 cases	No.	%
Asymptomatic	30	25
Mild	53	44.17
Moderate	25	20.83
Severe	12	10
Total	**120**	**100**

P. value <0.001

The study showed a significant relation between Covid-19 infection status with ageas the highest mean of age ofCovid-19 infected patients was recorded in those who with severe infection

Table 4: Relation of Covid-19 infection status with age

Covid-19 cases	Mean±SD	P. value
Asymptomatic	30.55±4.5	P<0.001
Mild	32.17±4.7	
Moderate	40.15±4.9	
Severe	58.5±5.4	

The study showed that the lowest mean of serum Vitamin was found in COVID-19 patients comparing with healthy control (12.8±3.6 *v.s.* 29.3±3.1 ng/ml) (P: <0.001).

Table 5: Levels of vitamin D in COVID-19 patients and the control group

Group	Mean (ng/ml)	SD	P value
COVID-19 patients	12.8	3.6	<0.001
Healthy group	29.3	3.1	

The study also demonstrated that the level of vit. D was significantly reduced in severe infected COVID-19 patients followed by patients with moderate infection and the highest mean was in patients with asymptomatic infection (P<0.001), Figure 1.

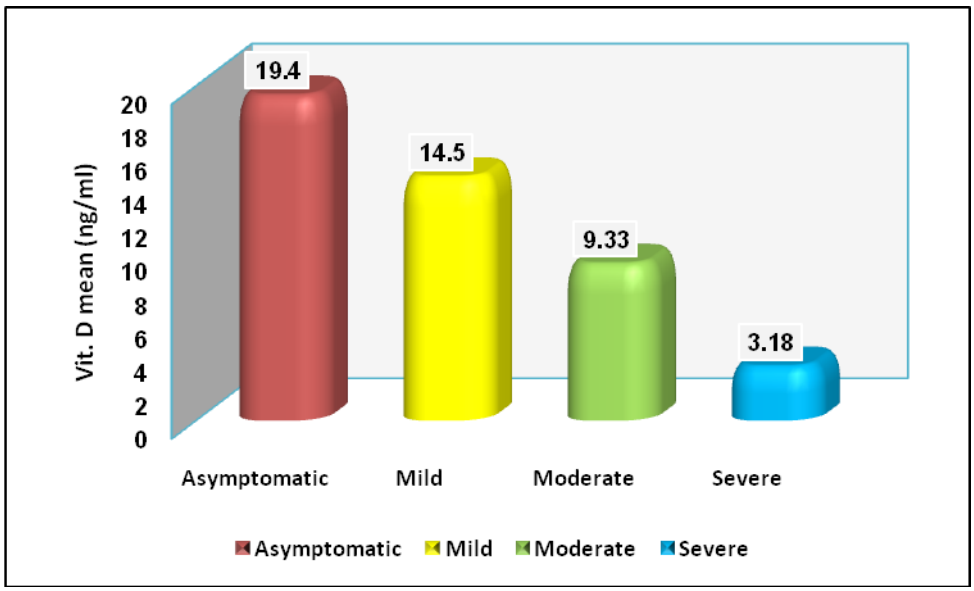

Figure 1: relation of Vit. D and severity of Covid-19 infection

Discussion

Numerous studies have found that the Covid-19 virus is spreading highly in eastern and Middle Eastern countries in Saudi Arabia, Iraq, Iran, Turkey and the Arab Gulf. Covid-19 and those with symptoms similar to those of Covid-19 were actually infected with the virus in this study [6]. And as our study found, the most people infected with the Covid-19 virus are among the people who spend cities, and as such, numerous studies were conducted at the beginning of this year and to the end of this day, as studies indicated that those who say cities are the most vulnerable to infection with covid 19, and there is no doubt [7-10]. Many studies conducted previously that young people are the most vulnerable to infection due to their frequent interaction with infected people, caring for the sick and suffering from health personnel or Of the people who provide services to the community, all the restaurants, clothes, shops, laboratories, and factories, all of them are young cadres who may be exposed to people infected with covid-19 and they do not know, then they may be infected, then they go to health centers, and then it is discovered that they are infected with Covid 19 [11,12]. Our findings about the increased risk of testing positive for COVID-19 with likely deficient vitamin D status compared with likely sufficient vitamin D status contrasts with the findings of a recent study by Xu et al [13]. Since vitamin D deficiency may be increased by many factors that could be associated with COVID-19 risk, including age, obesity, diabetes, and chronic illness more generally, observed associations of vitamin D with outcomes in almost any observational study may fail to accurately reflect any potential causal effects of vitamin D on outcomes. Some clinical and epidemiological studies support to outline the hypothesis regarding COVID-19 and its relationship with vitamin D status. Recent studies indicated that COVID-19 is associated with low vit D level [11,14]. In other studies, serum concentrations of 25(OH)D were inversely associated with pro-inflammatory cytokines, IL-6, increased CRP, and increased risk of pneumonia, ARDS, diabetes and heart failure . In randomized control trials, vitamin D supplementation has been shown to reduce the risk of respiratory diseases [15,16]. A placebo-controlled trial with 5660 subjects showed that vitamin D supplementation significantly reduces the risk of respiratory tract infections [17]. A review included five clinical studies reported that respiratory tract infections were significantly lower in the vitamin D supplementation group than the control group [18]. Another study included 25 randomized controlled trials, with 10,933 participants in total from 14 different countries indicated the beneficial effects of vitamin D

supplementation in reducing the risk of at least one acute respiratory tract infection[19].

Conclusions

There was a significant relation between vitamin-D reduced levels and severity of Covid-19 infection

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Conflict of Interest: None to declare.

Ethical Clearance: All experimental protocols were approved under the Kirkuk Health Directorate and all experiments were carried out in accordance with approved guidelines.

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