CHAPTER I
INTRODUCTION

1.1 Rational and background

At present chronic kidney disease (CKD) was recognized as a public health problem worldwide because of increasing prevalence, high mortality rate and spent a lot of money for health care management. (Sirivongs, 2008; Thomas et al., 2008) In the United States, the prevalence of patient with CKD was 1.8% for CKD stage 1, 3.2% for CKD stage 2, 7.7% for CKD stage 3, and 0.35 % for CKD stages 4 and 5, respectively. The patient with CKD stage 1 and 2 advanced to more severe stage was around 0.5% per year. Moreover the patient wit CKD stage 3 and 4 progressed to CKD stage 5 was 1.5% per year. (Thomas et al., 2008) Finding evidence in Thailand from retrospective study, the prevalence of patient with CKD who was calculated by Modification of Diet in Renal Disease (MDRD) equations was 0.8% for CKD stage 1, 0.7% for CKD stage 2, 2.9% for CKD stage 3, 0.1% for CKD stage 4 and 0.06% for CKD stage 5. (Chittinandana et al., 2006)

The patients with CKD would have many complications for example anemia, cardiovascular disease, dyslipidemia, fluid and electrolyte abnormalities, metabolic acidosis and mineral and bone disorder. These complex complications related to hospitalization in chronic kidney disease patients which might be urgently treated and prevented by health care team. (Hudson &Chaudhary, 2005; Thomas et al., 2008) The estimation of mortality rate from cardiovascular disease were 10- to 100- fold higher in dialysis patients than age- and sex-matched personally in general population. In addition, cardiovascular risk factor in patients with CKD associated with anemia, diabetes mellitus, dyslipidemia, hypertension, and mineral and bone disorder. (Thomas et al., 2008)

Chronic kidney disease - mineral and bone disorder (CKD-MBD) were systemic disorder of mineral and bone metabolism that demonstrated either one or combination of mineral metabolism abnormality, alteration of bone or extraskeletal calcification occurred in patients with CKD. (Moe et al., 2006) CKD-MBD caused by

initiation of mineral metabolism disturbances such as serum calcium, phosphate, vitamin D_3 (calcitriol) or parathyroid hormone (PTH). (Tomasello, 2007) Abnormality of vitamin D_3 and PTH level might be found in early stage of the patient with CKD. Calcium and phosphate level abnormalities would be started when the glomerular filtration rate (GFR) decreased in patient with CKD stage 3. The increasing of calcium, phosphate, vitamin D_3 and PTH value abnormalities would be found in advanced CKD stage 5. (Craver et al., 2007; Levin et al., 2007) Increasing in prevalence of serum calcium, phosphate and PTH abnormalities (calcium <8.4 mg/dL, phosphate <4.6 mg/dL and PTH >65 pg/mL) were found across decreasing of GFR. When GFR decreased to <60 mL/min/1.73 m^2, approximately 20%, 40% and 56% of serum calcium, phosphate and PTH abnormalities were found in patient with CKD, respectively. The prevalence of vitamin D_3 abnormality (vitamin D_3 <22 pg/mL) was 60% in patient with GFR <30 mL/min/1.73 m^2. (Levin et al., 2007)

In the United States, mortality risk in 40,538 hemodialysis patients was related to 17.5% for mineral and bone disorder. It was more than any other mortality risks such as 11.3% for anemia and 5.1% for inefficient dialysis. (Block et al., 2004) In dialysis patients, serum phosphate lower and higher than target was associated with increasing of mortality risk around 10-61% and 10-40%, respectively. Furthermore serum calcium, calcium x phosphate product (CaxP product) and PTH more than target level were related to rising of mortality risk 15-53%, 14-50% and 18%, respectively. (Block et al., 1998; Block et al., 2004; Kimata et al., 2007; Noordzij et al., 2005) In pre-dialysis patients, each 1 mg/dL increasing of serum phosphate was consistent increasing with 23% all-cause mortality risk and 35% acute myocardial infarction. Serum phosphate value more than 3.5 mg/dL was 32% significant increasing of mortality risk when compared to serum phosphate 2.5-2.9 mg/dL. (Kestenbaun et al., 2005)

Kidney Disease Outcomes Quality Initiative (K/DOQI) clinical practice guideline for bone metabolism and disease 2003 was published to improve the clinical management of the patient with CKD, to decrease and/or prevent mineral and bone disorder and to prevent risk of cardiovascular disease. The guideline provides recommendation for frequency of clinical parameters monitoring to resolve serum calcium, phosphate and PTH, and comprising calculated values for CaxP product. Acceptable goal for these

clinical parameters were considered, including using of phosphate binder and vitaminD_3. (National Kidney Foundation, 2003) The study in 22,937 hemodialysis patients, controlling of clinical parameters in mineral and bone disorder within target recommendations were strong evidence for predicted survival. The evidence was indicated that patient with CKD who could not controlled all three clinical parameters (calcium, phosphate and PTH level) had 51% significant increasing of mortality risk compared to the patient who could controlled all of three clinical parameters (Danese et al., 2008)

Srinagarind hospital is a 650-bed public tertiary-care referral medical center in the Northeast of Thailand. There are many physicians and health care teams practice in pre-dialysis and dialysis clinic. Clinical parameters monitoring, using of phosphate binders, using of vitaminD_3 and achievement of serum calcium, phosphate, calcium-phosphate product and PTH in the patient with CKD would be determined whether they were adhered to practice guideline.

1.2 Objectives of this study

1.2.1 General objective

To determine adherence to clinical practice guideline in the patient with CKD.

1.2.2 Specific objectives

1.2.2.1 The percentage of adherence to clinical practice guideline in the patient with CKD.

1) The percentage of adherence to clinical parameters monitoring; calcium, phosphate and PTH.

2) The percentage of adherence to using of phosphate binder.

3) The percentage of adherence to using of vitaminD_3.

1.2.2.2 The percentage of target recommendations achievement as follow: serum calcium, phosphate, CaxP product and PTH.

1.2.2.3 The comparison of percentage of target recommendation achievement between adherent and non-adherent patients.

1.3 Potential benefits of the study

1.3.1 To report patient outcome for mineral and bone disorder in patient with CKD who had been followed at pre-dialysis and dialysis clinic, nephrology unit, Srinagarind hospital.

1.3.2 To promote using of mineral and bone disorder clinical practice guideline at Srinagarind hospital.

1.3.3 To improve outcome of mineral and bone disorder in patient with CKD at pre-dialysis and dialysis clinic, nephrology unit, Srinagarind hospital.

1.3.4 To enhance using of phosphate binders and vitaminD_3 according to mineral and bone disorder clinical practice guideline at Srinagarind hospital.