UNIVERSITY OF JAFFNA, SRI LANKA

THIRD YEAR FIRST SEMESTER EXAMINATION IN BScHons (MLS)- 2023

MLSRM 3113 RESEARCH METHODOLOGY AND MEDICAL STATISTICS

Date: 05.12.2024 Time: 3 Hours

Answer all Four Questions. Marks allotted to each part are given in brackets.

Answer each Part in separate answer books.

Part A

1. The abstract of a research report published in an authenticated peer-reviewed journal is given,

   1.1. Name the Journal and its Publisher. (10 marks)

   1.2. State the volume and issue of the journal. (10 marks)

   1.3. State the knowledge gap studied in the research report. (15 marks)

   1.4. List two (02) indicators (Journal metrics) used to check the quality of a journal. (10 marks)

   1.5. State the study design applied in the given report. (10 marks)

   1.6. List two (02) sampling techniques that are suitable for the above research study (15 marks)

   1.7. Briefly explain why the authors did regression analysis in this research. (15 marks)

   1.8. Write a possible recommendation for the findings shown in the report. (15 marks)

Part B

2.

   2.1. Explain the significance of survey-based studies in the medical field. (30 marks)

   2.2. Differentiate between qualitative and quantitative research methods, providing examples. (30 marks)

   2.3. A dairy product company has developed a yogurt drink with a potential weight loss effect. They aim to evaluate its effectiveness through a double-blinded randomized controlled trial. Describe the key steps involved in conducting this study. (40 marks)

Part C

3.

3.1 The following data are taken from a study done to investigate the relationship between serum cholesterol and ischaemic heart disease. A total of 400 persons were studied, of whom 100 had ischaemic heart disease and 175 had high serum cholesterol levels. Of the 300 controls, 100 had high serum cholesterol levels.

3.1.1. Present the above data in a 2x2 table (40 marks)

3.1.2 Name the statistical test/s you would use to decide whether there is an association between ischaemic heart disease and serum cholesterol level. (20 marks)

3.1.3 How could you assess the risk of high serum cholesterol on ischaemic heart disease? (20 marks)

3.2 Women with PCOS had a higher prevalence of NAFLD compared to women without PCOS.

(relative risk =2.23; 95% confidence interval =1.86 to 2.66)

3.2.1 Comment on the choice of this measure of risk (relative risk) (10 marks)

3.2.2 Giving reasons, indicate if the association is significant or not (10 marks)

Part D

4.

4.1 Give an example for each of the event.

4.1.1 Mutually exclusive events (05 marks)

4.1.2 Collectively exhaustive events (05 marks)

4.2 In an experiment, it is given that $P(A) = 0.75$, $P(B) = 0.3$, $P(A|B) = 0.75$ and $P(A \cap B) = 0.225$. Justify your answers to the following questions numerically.

4.2.1 Are A and B independent? (10 marks)

4.2.2 Are A and B mutually exclusive? (10 marks)

4.2.3 What is $P(B|A)$? (05 marks)

4.3 A company employing 10,000 workers offer deluxe medical coverage (D), standard medical coverage (S), and economy medical coverage (E) to its employees. Of the employees, 30% have D, 60% have S and 10% have E. From past experience, the probability that an employee with D will submit no claims during next year is 0.1. The corresponding probabilities for employees with S and E are 0.4 and 0.7 respectively. If an employee is selected at random,

4.3.1 What is the probability that the selected employee will not submit a claim during next year? (15 marks)

4.3.2 If a selected employee does not submit any claim during the next year, what is the probability that the employee has D? (15 marks)

4.4. Suppose that we are told that the heights of adult males in a particular region of the world are normally distributed with a mean of 70 inches and standard deviation of 2 inches.

4.4.1 Approximately what proportion of adult males are taller than 73 inches? (10 marks)

4.4.2 What proportion of adult males are between 72 and 73 inches? (10 marks)

4.4.3 What height corresponds to the point where 20% of all adult males are greater than this height? (15 marks)

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RESEARCH Open Access

Relationship between bone turnover markers and renal disease in elderly patients with type 2 diabetes: a cross-sectional study

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Abstract

Objective The prevalence of type 2 diabetes mellitus (T2DM) and bone metabolism disorders increase with age. Diabetic kidney disease (DKD) is one of the most serious microvascular complications of T2DM, and bone metabolism disorders are closely linked to the occurrence of DKD. The relationship between bone turnover markers(BTMs) and the kidney disease in elderly patients with T2DM remains unclear. Therefore, this study aims to investigate the association between common BTMs and DKD in a large sample of elderly patients. The goal is to provide a basis for early identification of high-risk individuals for DKD among elderly T2DM patients from a bone metabolism perspective.

Methods In this cross-sectional study, BTMs were collected from a cohort of 2,051 hospitalized Chinese patients. The relationships between 25-hydroxyvitamin D (25-OH-D), β-CrossLaps (β-CTX), osteocalcin (OSTEOC), intact parathyroid hormone (iPTH), and total type I collagen N-terminal propeptide (TP1NP), and DKD, as well as urinary albumin-to-creatinine ratio (UACR) and estimated glomerular filtration rate (eGFR) were analyzed using regression analysis and restrictive cubic spline (RCS) curves.

Results Higher 25-OH-D levels were independently linked to a lower incidence of DKD and decreased UACR. The RCS curves showed a linear association of 25-OH-D and DKD, approaching the L-shape. β-CTX was independently and positively correlated with UACR. There is an independent positive correlation between OSTEOC and UACR and a negative correlation with eGFR. iPTH is independently and positively correlated with DKD incidence and UACR, and negatively correlated with eGFR. Additionally, the RCS curves showed a non-linear association of OSTEOC and iPTH and DKD, approaching the J-shape, and the point of inflection is 10.875 ng/L and 34.15 pg/mL respectively. There is an independent positive correlation between TP1NP and UACR incidence, and a negative correlation with eGFR. Risk estimates significantly increase with higher TP1NP levels in the RCS model.

Conclusion BTMs are closely associated with kidney disease in elderly patients with T2DM. These discoveries potentially assist clinicians in establishing more preventive measures and targeted treatment strategies for elderly patients with T2DM.

Keywords Diabetic kidney disease, Bone turnover markers, 25-hydroxyvitamin D, β-CrossLaps, Osteocalcin, Intact parathyroid hormone, Total type I collagen N-terminal propeptide, Type 2 diabetes mellitus, Elderly

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