HEPATITIS B VACCINATION FOR PATIENTS WITH STAGE 4 CHRONIC KIDNEY DISEASE - RESPONSE AND AFFECTING FACTORS : A PROSPECTIVE STUDY

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BACKGROUND

Hep B vaccination

Standard of care

In

dialysis & transplant population

Vaccine response rate is low in HD pts (42%)

(Elehana et al , 2018)

Immune function decline correlates eGFR decline

(Da Silva et al, 2018)

Suggestions of early CKD vaccination

(Mysore et al, 2021)

Limited studies & variations of practice

(Nadeem et al, 2021)

AIM OF THIS STUDY

To investigate the **response rate** and **affecting factors** of the hepatitis B vaccine in patients with stage 4 CKD

METHODS

Study design
Prospective cohort study

Location
Single renal unit
Armadale Hospital
Western Australia

Duration
Jul 2022-Jan2025
HREC approval
participant consent

Inclusion
Stage 4 CKD
HBsAb <10mIU/mL

Exclusion
HBsAb positive
HBsAg positive
Previously vaccinated

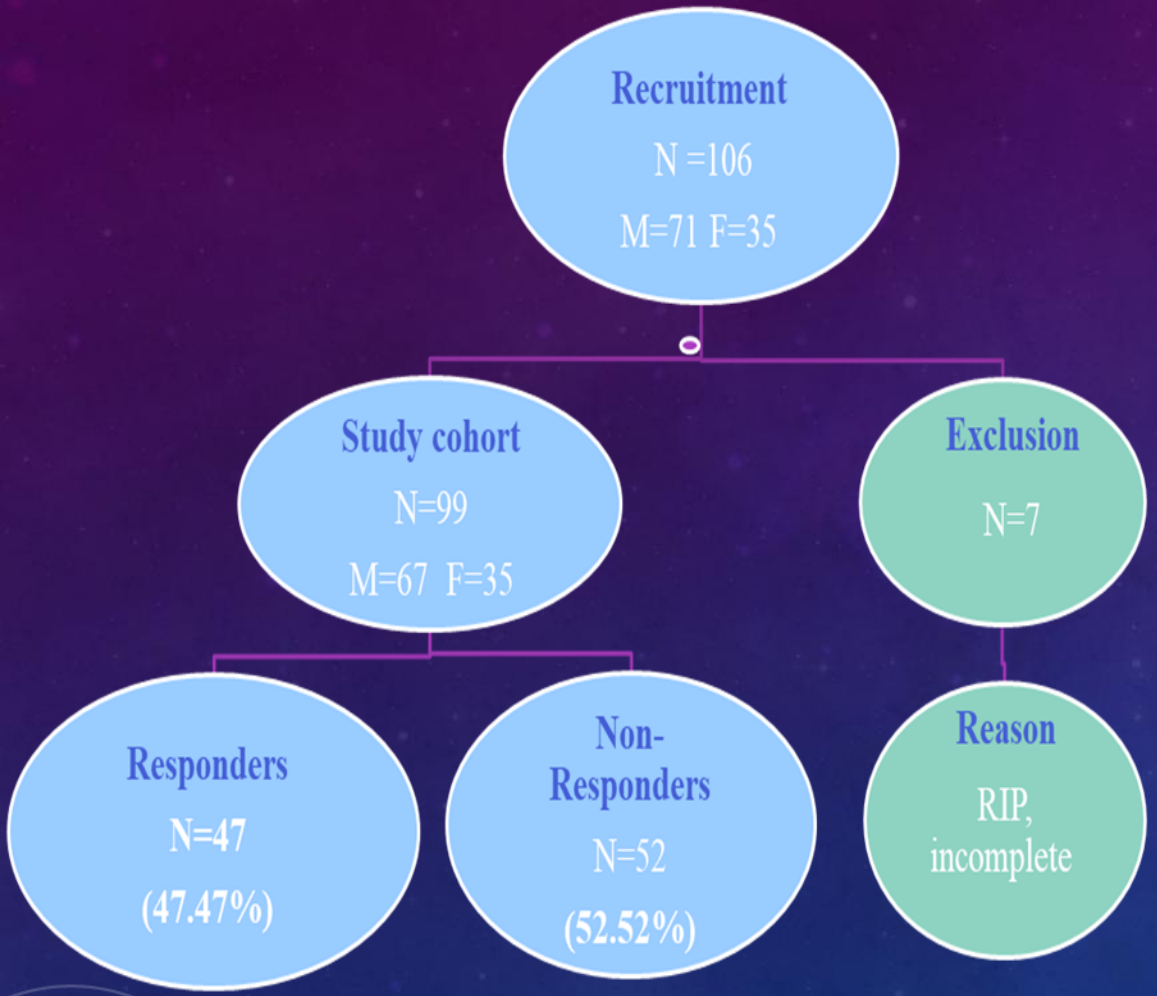
Vaccine
H_B_VAX II
40 mcg IMI Deltoid
0-1-6-month

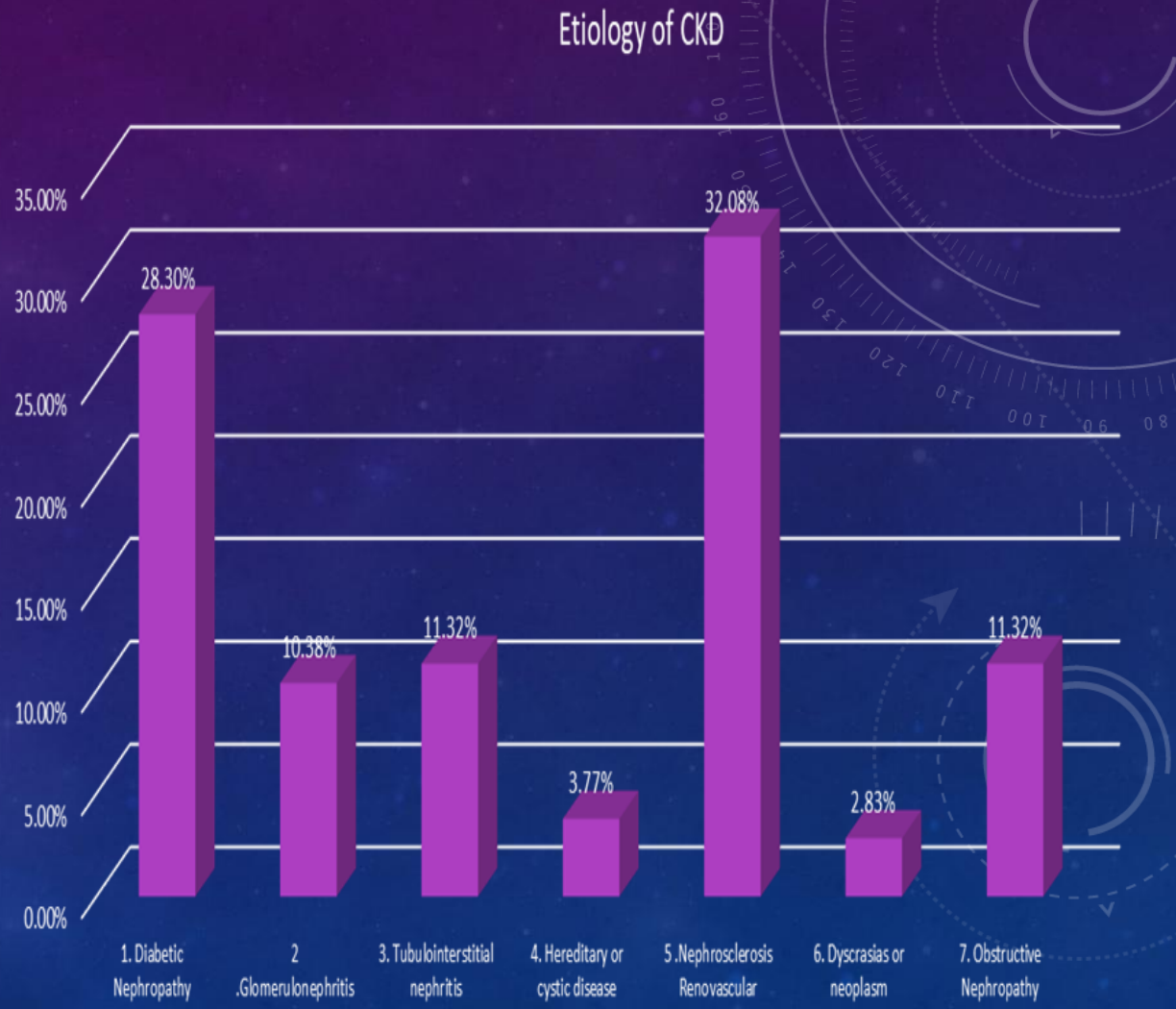
Response measure
6-8 weeks post last dose

Seroconversion
HBsAb > 10 mIU/mL

Data Analysis
SPPS V29
P <0.05 Significant

RESULTS


Recruitment
N =106
M=71 F=35
Study cohort
N=99
M=67 F=35
Exclusion
N=7
Responders
N=47
(47.47%)
Non-Responders
N=52
(52.52%)
Reason
RIP, incomplete


Etiology of CKD
35.00%
30.00%
25.00%
20.00%
15.00%
10.00%
5.00%
0.00%
28.30%
10.38%
11.32%
3.77%
32.08%
2.83%
11.32%
1. Diabetic Nephropathy
2 .Glomerulonephritis
3. Tubulointerstitial nephritis
4. Hereditary or cystic disease
5 .Nephrosclerosis Renovascular
6. Dyscrasias or neoplasm
7. Obstructive Nephropathy

RESULTS

1. Vaccine response rate : 47.47%

2. Factors associated with negative vaccine response
   - age (*P*=0.001)
   - presence of cardiovascular disease (*P*=0.011)
   - Vitamin D3 deficiency (*P*=0.028)
   - lower transferrin saturation (*P*=0.045)
   - presence of multiple comorbidities* (*P*=0.017)

***Comorbidities in this study: DM; HT; CVD; COPD; OSA; S ALB; ESA Dependence**

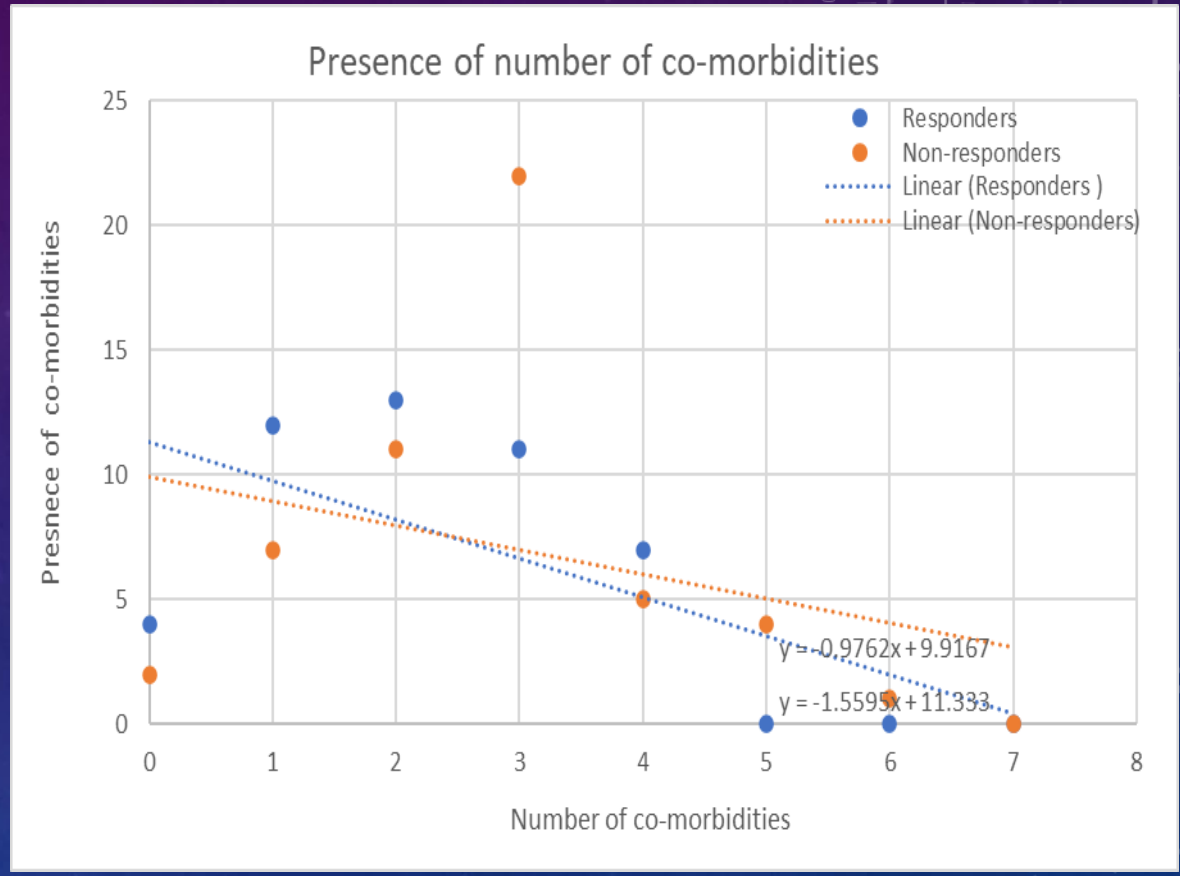
5 FACTORS WITH NEGATIVE VACCINE IMPACT

Affecting factors	Reasons for their negative impact on the vaccine
Age (older)	Bone marrow depression →impaired humoral & cellular response *(Yang et al, 2016)*
Presence of CVD	Inflammation and oxidative stress →Tregs dysfunction *(Zhang et al,2024)*
TSAT (low)	Indicative of malnutrition, inflammation. Reduced B &T-cell activation and proliferation →impaired adaptive immunity *(Stoffel et al, 2024)*
Vitamin D (deficiency)	Inhibition of B & T cells proliferation, altered cytokines production → Impaired regulation of immune response *(Ghaseminejad-Raeini et al , 2023)*
Multiple co-morbidities	A higher number of morbidities exerts a stronger negative effect on immune function and vaccine response. *(MacRae et al, 2021)*

NUMBER OF CO-MORBIDITIES

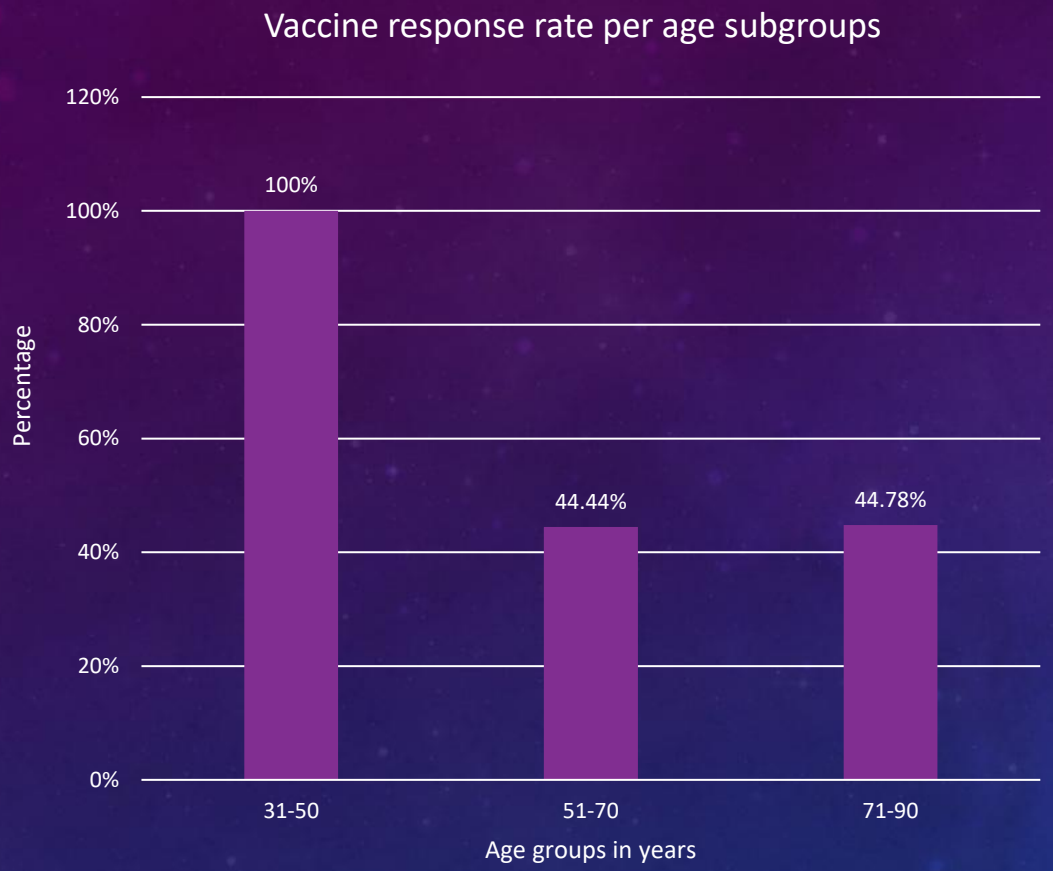
Number of Co-morbidities	Responders	Non-responders
0	4	2
1	12	7
2	13	11
3	11	22
4	7	5
5	0	4
6	0	1
7	0	0

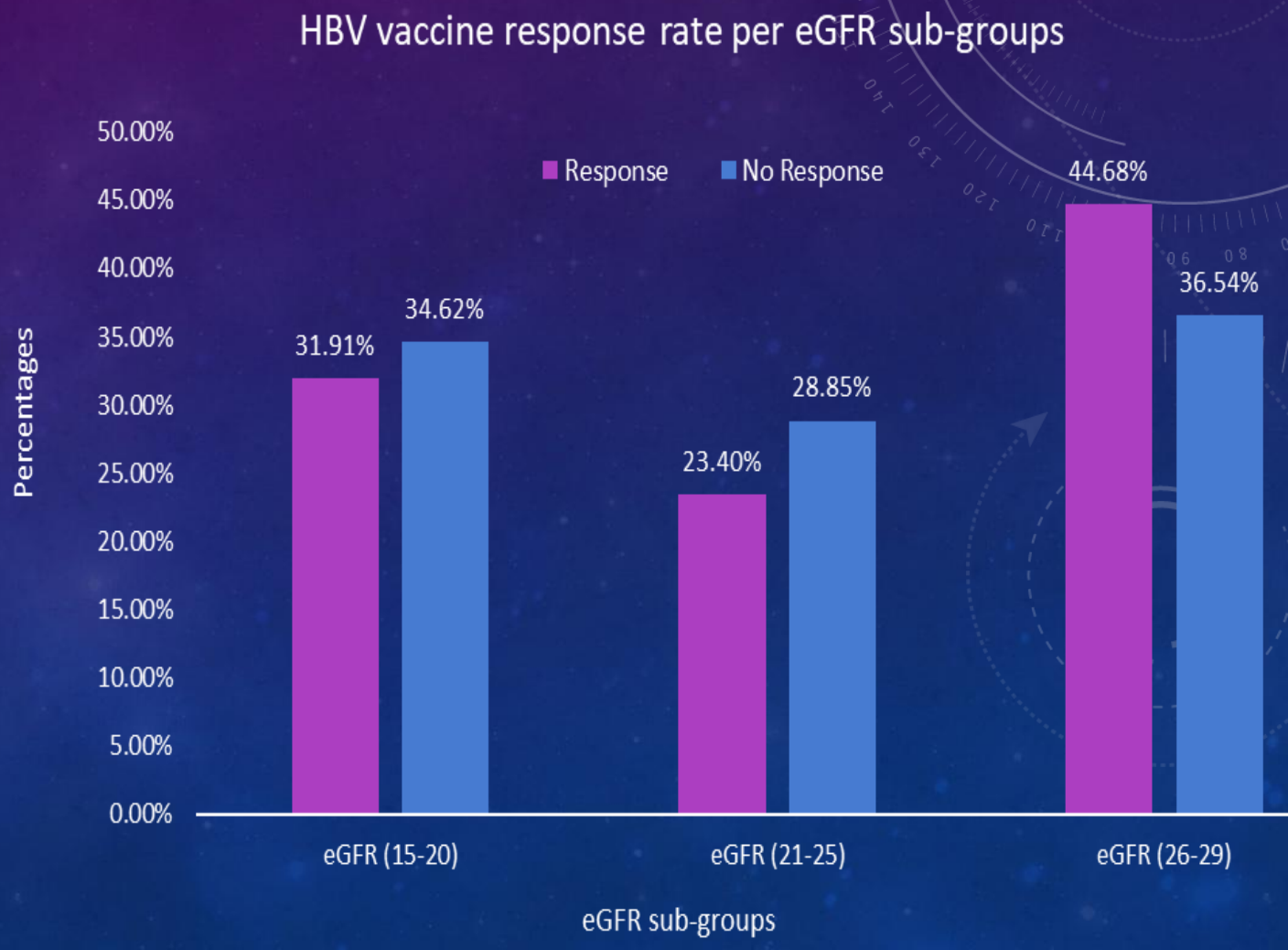
Responder : maximum co-morbidities = 4
Non-responders: maximum co-morbidities = 6



Comorbidities in this study:
Diabetes Mellitus; Hypertension; Cardiovascular disease; Chronic obstructive pulmonary disease; Obstructive sleep apnea; S albumin; ESA dependence

SUBGROUP ANALYSIS: AGE & EGFR





CONCLUSION

- Hep B vaccine seroconversion rate remains low even at stage 4 CKD
- Five affecting factors were identified
- Older age subgroup weaker response : (71-90) <(51-70)<(31-50) years old.
- Higher eGFR subgroup better response : eGFRs 26-29 >21-25>15-20
- Recognizing the affecting factors vital for patient focused vaccine management
- Consider HBV vaccination to be initiated no later than stage 4 CKD

ACKNOWLEDGEMENT

Thank **all the participants** in the study;

some travelled afar > 60 km per way from our renal clinic.

commitment in completing the rigorous six-month vaccination & post vaccination follow up

My Supervisors:

A/Prof Karen Heslop , Curtain University, WA

A/Prof Hemant Kulkarni, Armadale Hospital, WA

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ANZSN
CONGRESS
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SHAPING AOTEAROA &
AUSTRALIAN KIDNEY HEALTH:
PAST, PRESENT AND FUTURE
30 AUG – 3 SEP 2025 PERTH, WA
THANK YOU