

PUASA DAN KESIHATAN

Persediaan bagi pesakit buah pinggang

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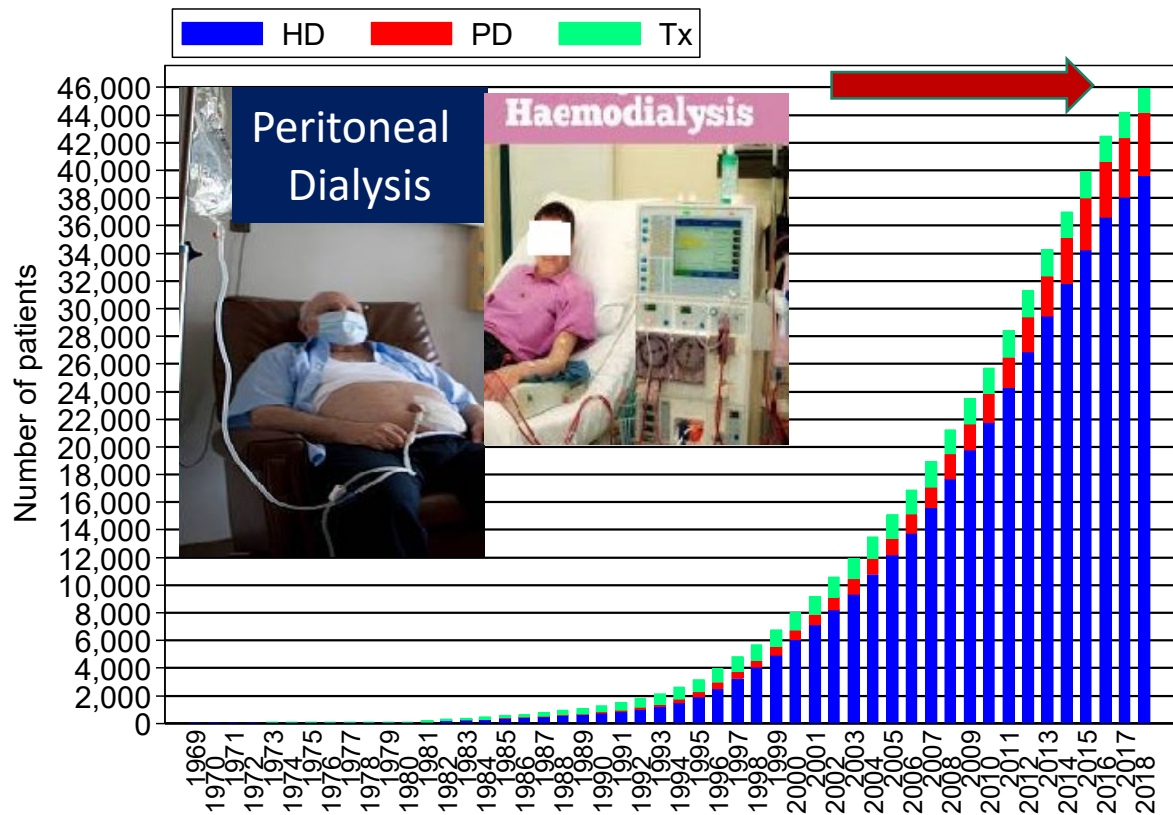
Kandungan ceramah

- Beban penyakit buah pinggang (CKD)– Prevalen
- Faktor risiko penyakit buah pinggang dan peranan amalan berpuasa
- Kesan amalan berpuasa keatas pesakit CKD
- Mencegah komplikasi dikalangan pesakit CKD jika berpuasa
- Rumusan

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Prevalence of End Stage Kidney Disease in Malaysia – MDR Report 2018



- More than 60% are diabetics,
- hypertensives,
- increasing age,
- glomerulonephritis

50994 for year of 2020

Year	2018	2017	2016	2015
Dialysis Patients	44136	42355	40627	38028
HD Patients	39593	38061	36638	34236
PD Patients	4543	4294	3989	3792
Transplant Patients	1801	1840	1821	1849
Dialysis Rate, pmp	1363	1322	1316	1247
HD Rate, pmp	1223	1188	1187	1123
PD Rate, pmp	140	134	129	124
Transplant Rate, pmp	56	57	59	61
HD, %	86.2	86.1	86.3	85.9
PD, %	9.9	9.7	9.4	9.5
Tx, %	3.9	4.2	4.3	4.6

Prevalence of chronic kidney disease and its associated factors in Malaysia; findings from a nationwide population-based cross-sectional study



Thamil Arasu Saminathan^{1*}, Lai Seong Hooi², Muhammad Fadhli Mohd Yusoff¹, Loke Meng Ong³, Sunita Bavanandan⁴, Wan Shakira Rodzlan Hasani¹, Esther Zhao Zhi Tan⁵, Irene Wong⁶, Halizah Mat Rifin¹, Tania Gayle Robert¹, Hasimah Ismail¹, Norazizah Ibrahim Wong¹, Ghazali Ahmad⁴, Rashidah Ambak¹, Fatimah Othman¹, Hamizatul Akmal Abd Hamid¹ and Tahir Aris¹

Prevalence of CKD in Malaysia was 15.48% (95% CI: 12.30, 19.31) in 2018

Prevalence of CKD by stages (N = 890)

CKD Stages	n	Estimated population	Prevalence (%)	95% CI
Total CKD	158	2,607,448	15.48	12.30, 19.31
Stage 1	42	649,069	3.85	2.51, 5.87
Stage 2	51	811,853	4.82	3.14, 7.32
Stage 3	59	1,091,582	6.48	4.41, 9.43
Stage 4–5	6	54, 944	0.33	0.14, 0.78

Risk Factors

Increasing Age
Diabetes
Hypertension
Increased BMI

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Causes-Risk Factors of Chronic Kidney Disease

✓ **NCDs – Hypertension, Diabetes Mellitus, Obesity/Dyslipidemia**

- Glomerulonephritis- IgA nephropathy , Membranous GN, FSGS etc
- Systemic Diseases eg SLE, Rheumatoid Arthritis, Systemic Sclerosis-MCTD etc

✓ **Cardiorenal syndrome**

✓ **Acute Kidney Injury**

- Increasing age
- Hereditary-Genetic : AD Polycystic Kidney Disease

✓ **Nephrotoxins-Drug Toxicity: NSAIDs, Radiocontrasts, Herbs, heavy metals**

✓ **Chronic infections – Hepatitis B, Hepatitis C, HIV, TB,**

✓ **Chronic obstruction of urinary tract, renal calculi**

Prevalence of chronic kidney disease in Asia: a systematic review and analysis

Thaminda Liyanage,^{1,2,3} Tadashi Toyama,⁴ Toshihiro Niwemitsu,⁶ Mladen Radkovic,^{1,7}

Estimated prevalence and number of people with CKD (overall and stages 4–5) in

Cluster	Countries	No of people aged ≥20 years in 2020 (× million)	Overall CKD*				Prevalence (%; 95% CI)
			Population-based studies		All studies		
			No of patients (× million; 95% CI)	Prevalence (%; 95% CI)		No of patients (× million; 95% CI)	
1	Afghanistan	18.02	3.06 (2.74 to 3.39)	17.0 (15.2 to 18.8)‡	2.61 (2.18 to 3.03)	14.7 (10.6 to 18.9)‡	
	Pakistan§	122.00	8.71 (7.79 to 9.64)	17.0 (15.2 to 18.8)	7.43 (6.2 to 8.61)	14.7 (10.6 to 18.9)‡	
2	Bangladesh	105.04	17.23 (2.1 to 32.35)	16.4 (2.0 to 30.8)	20.8 (10.29 to 31.41)	15.4 (10.6 to 18.9)‡	
	Bhutan	0.51	0.07 (0.05 to 0.1)	14.7 (10.6 to 18.9)‡	0.08 (0.06 to 0.1)	15.4 (10.6 to 18.9)‡	
	Nepal	17.55	2.56 (1.81 to 3.32)	14.6 (10.3 to 18.9)	2.56 (1.81 to 3.32)	14.6 (10.3 to 18.9)	
3	Cambodia	10.09	1.12 (0.83 to 1.42)	11.1 (8.2 to 14.1)‡	1.12 (0.83 to 1.42)	11.1 (8.2 to 14.1)‡	
	Laos	4.24	0.47 (0.35 to 0.6)	11.1 (8.2 to 14.1)‡	0.47 (0.35 to 0.6)	11.1 (8.2 to 14.1)‡	
	Myanmar	35.47	3.94 (2.91 to 5)	11.1 (8.2 to 14.1)‡	3.94 (2.91 to 5)	11.1 (8.2 to 14.1)‡	
	India	892.94	108.05 (85.72 to 131.26)	12.1 (9.6 to 14.7)	108.05 (85.72 to 131.26)	12.1 (9.6 to 14.7)	
	Indonesia	179.26	15.42 (12.91 to 17.93)	8.6 (7.2 to 10.0)	15.42 (12.91 to 17.93)	8.6 (7.2 to 10.0)	
	Philippines	66.20	7.35 (5.43 to 9.33)	11.1 (8.2 to 14.1)‡	7.35 (5.43 to 9.33)	11.1 (8.2 to 14.1)‡	
	Timor-Leste	0.68	0.08 (0.06 to 0.1)	11.1 (8.2 to 14.1)‡	0.08 (0.06 to 0.1)	11.1 (8.2 to 14.1)‡	
	Viet Nam	68.26	8.74 (7.71 to 9.69)	12.8 (11.3 to 14.2)	8.74 (7.71 to 9.69)	12.8 (11.3 to 14.2)	
	North Korea	17.88	1.98 (1.47 to 2.52)	11.1 (8.2 to 14.1)‡	1.98 (1.47 to 2.52)	11.1 (8.2 to 14.1)‡	
	4	Brunei	0.31	0.04 (0.02 to 0.06)	12.2 (5.8 to 18.6)‡	0.04 (0.02 to 0.06)	12.2 (5.8 to 18.6)‡
Malaysia		22.11	2.7 (1.28 to 4.11)	12.2 (5.8 to 18.6)	2.7 (1.28 to 4.11)	12.2 (5.8 to 18.6)	
5	China	1102.05	101.39 (81.55 to 121.23)	9.2 (7.4 to 11.0)	101.39 (81.55 to 121.23)	9.2 (7.4 to 11.0)	
	Thailand	53.87	5.39 (2.69 to 8.03)	10.0 (5.0 to 14.9)	5.39 (2.69 to 8.03)	10.0 (5.0 to 14.9)	
	Sri Lanka	14.68	1.16 (0 to 2.83)	7.9 (0.0 to 19.3)	1.16 (0 to 2.83)	7.9 (0.0 to 19.3)	
	Maldives	0.41	0.04 (0.03 to 0.04)	8.9 (7.4 to 10.5)‡	0.04 (0.03 to 0.04)	8.9 (7.4 to 10.5)‡	
	Taiwan	19.58	1.45 (0.72 to 2.19)	7.4 (3.7 to 11.2)	1.45 (0.72 to 2.19)	7.4 (3.7 to 11.2)	
	Japan	105.03	13.34 (11.24 to 15.44)	12.7 (10.7 to 14.7)	13.34 (11.24 to 15.44)	12.7 (10.7 to 14.7)	
	Singapore	4.87	1.67 (0 to 3.45)	34.3 (0.0 to 71.0)	1.67 (0 to 3.45)	34.3 (0.0 to 71.0)	
	South Korea	42.36	2.97 (2.16 to 3.77)	7.0 (5.1 to 8.9)	2.97 (2.16 to 3.77)	7.0 (5.1 to 8.9)	
	Iran	57.68	6.17 (4.33 to 8.08)	10.7 (7.5 to 14.0)	6.17 (4.33 to 8.08)	10.7 (7.5 to 14.0)	
	Mongolia	2.04	0.16 (0.13 to 0.19)	7.8 (6.2 to 9.5)	0.16 (0.13 to 0.19)	7.8 (6.2 to 9.5)	
6	Total	2963.12	315.24 (236.02 to 396.07)	10.6 (8 to 13.4)	434.35 (350.19 to 519.67)	14.7 (11.8 to 17.5)	
	Sri Lanka	14.68	1.16 (0 to 2.83)	7.9 (0.0 to 19.3)	1.16 (0 to 2.83)	7.9 (0.0 to 19.3)	
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	Iran	57.68	6.17 (4.33 to 8.08)	10.7 (7.5 to 14.0)	6.17 (4.33 to 8.08)	10.7 (7.5 to 14.0)	
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	Total	2963.12	315.24 (236.02 to 396.07)	10.6 (8 to 13.4)	434.35 (350.19 to 519.67)	14.7 (11.8 to 17.5)	

8.6-34.3% OF ADULT POPULATION

Global, regional, and national burden of chronic kidney disease, 1990–2017: a systematic analysis for the Global Burden of Disease Study 2017

GBD Chronic Kidney Disease Collaboration*

GLOBAL CKD BURDEN

www.thelancet.com Vol 395 February 29, 2020

Last Asia	139 556 765 (128 479 977 to 151 557 920)	7201 (6677 to 7766)	-5.9% (-7.9 to -4.1)	189 323 (174 072 to 197 062)	10.2 (9.4 to 10.6)	-17.9% (-28.7 to -12.6)
China	132 324 202 (121 756 611 to 143 737 211)	7180 (6658 to 7747)	-6.1% (-8.1 to -4.3)	175 891 (160 601 to 183 366)	10.0 (9.2 to 10.4)	-19.0% (-30.2 to -13.6)
North Korea	2233310 (2 069 070 to 2 414 053)	7300 (6796 to 7885)	2.5% (-0.2 to 5.4)	3639 (3088 to 4240)	12.3 (10.4 to 14.3)	10.3% (-9.6 to 36.8)
Taiwan (province of China)	2751072 (2 552 629 to 2 961 715)	8145 (7557 to 8770)	-4.9% (-8.0 to -1.7)	6743 (6319 to 7164)	17.4 (16.3 to 18.5)	-15.5% (-21.9 to -8.8)
Southeast Asia	69 598 036 (64 285 483 to 75 118 675)	10 802 (10 029 to 11 635)	6.0% (3.8 to 8.3)	134 459 (127 712 to 142 283)	24.5 (23.3 to 25.8)	-4.3% (-9.8 to 2.1)
Cambodia	1262506 (1 165 067 to 1 366 871)	9580 (8872 to 10 366)	1.7% (-2.0 to 5.7)	1838 (1621 to 2097)	17.1 (15.3 to 19.5)	-33.3% (-43.4 to -21.5)
Indonesia	27 232 922 (25 084 990 to 29 398 099)	11 164 (10 372 to 12 008)	7.6% (5.5 to 10.0)	35 446 (33 322 to 38 551)	17.3 (16.2 to 19.3)	-16.5% (-23.8 to -8.9)
Laos	573 411 (529 796 to 620 592)	10 781 (10 001 to 11 628)	1.9% (-1.3 to 5.2)	1046 (881 to 1211)	24.8 (21.3 to 28.6)	-38.8% (-49.9 to -26.0)
Malaysia	3 187 367 (2 920 099 to 3 476 760)	11 079 (10 178 to 12 020)	9.7% (5.9 to 13.8)	4731 (4285 to 5249)	21.1 (19.1 to 23.2)	-3.6% (-15.0 to 13.5)
Maldives	41 258 (37 840 to 44 813)	10 021 (9311 to 10 796)	-8.0% (-10.8 to -5.2)	68 (62 to 75)	25.5 (23.1 to 28.1)	-54.8% (-61.2 to -47.8)
Mauritius	218 092 (201 865 to 235 917)	13 768 (12 789 to 14 903)	19.1% (14.1 to 24.1)	1070 (978 to 1158)	67.0 (61.4 to 72.3)	54.4% (39.1 to 68.8)
Myanmar	5 258 275 (4 859 659 to 5 677 295)	10 658 (9909 to 11 506)	2.6% (-0.5 to 5.4)	12 026 (10 523 to 13 747)	28.4 (25.0 to 32.5)	-31.9% (-44.8 to -16.5)
Philippines	9 317 802 (8 615 652 to 10 028 481)	11 049 (10 263 to 11 879)	13.2% (10.2 to 16.1)	34 051 (30 042 to 38 555)	50.3 (44.5 to 56.4)	108.9% (83.0 to 137.8)
Sri Lanka	2 745 171 (2 543 226 to 2 967 595)	11 428 (10 612 to 12 348)	15.9% (12.3 to 19.4)	4512 (3727 to 5288)	19.9 (16.7 to 23.1)	-17.0% (-30.9 to -1.9)
Seychelles	12 354 (11 436 to 13 289)	11 094 (10 330 to 11 897)	3.5% (0.8 to 6.4)	41 (38 to 45)	41.4 (38.0 to 44.7)	24.4% (9.1 to 38.6)
Thailand	9 560 638 (8 760 453 to 10 414 024)	10 292 (9461 to 11 174)	-3.9% (-7.2 to -0.3)	21 922 (19 297 to 24 420)	23.3 (20.5 to 25.9)	-12.6% (-23.6 to -0.7)
Timor-Leste	93 556 (86 875 to 101 038)	10 362 (9623 to 11 208)	3.6% (0.4 to 7.1)	147 (121 to 175)	19.4 (16.3 to 22.8)	-26.1% (-39.9 to -9.8)
Vietnam	10 003 107 (9 262 628 to 10 787 589)	10 107 (9407 to 10 887)	5.4% (1.9 to 9.1)	17 384 (15 393 to 19 609)	20.6 (18.2 to 23.0)	-20.2% (-32.6 to -5.0)
Oceania	1 097 010 (1 007 760 to 1 187 872)	12 329 (11 465 to 13 266)	9.0% (6.5 to 11.4)	2900 (2500 to 3318)	45.2 (40.0 to 50.0)	22.3% (2.9 to 39.3)
American Samoa	6328 (5837 to 6843)	13 217 (12 268 to 14 234)	11.1% (8.0 to 14.4)	24 (21 to 26)	64.6 (57.2 to 71.3)	58.5% (27.2 to 83.5)

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PUBLISHED RISK FACTORS FOR CKD IN DIFFERENT COUNTRIES IN ASIA PACIFIC

	CKD risk factors
Beijing	<ul style="list-style-type: none"> • Older age (odds ratio 1.83) • Nephrotoxic medication (odds ratio 2.19) • Rural area (odds ratio 0.47) • History of cardiovascular disease (odds ratio 2.04) • High-density lipoprotein cholesterol <1.03 mmol/L (odds ratio 3.00) • Hypertension status >10 years (odds ratio 1.85)
Australia	<p>Independent predictors of proteinuria</p> <ul style="list-style-type: none"> • Age 65 (odds ratio 2.5) • Diabetes mellitus (odds ratio 2.5) • Hypertension (odds ratio 3.1)
Singapore	<p>Independent predictors of proteinuria</p> <ul style="list-style-type: none"> • Age 61 (odds ratio 2.7) • Malay race (odds ratio 1.3) • Diabetes mellitus (odds ratio 2.0) • Hypertension (odds ratio 1.8) • Renal disease (odds ratio 3.5) • Body mass index 30 kg/m² (odds ratio 2.5) • Haematuria (odds ratio 2.9) • Family history of kidney disease (odds ratio 2.0)
Taiwan	<p>Predictors of CKD</p> <ul style="list-style-type: none"> • Regular use of Chinese herbal medicine (odds ratio 1.2)

	CKD risk factors		CKD risk factors
South Korea	Independent predictors of CKD <ul style="list-style-type: none"> • Female gender (odds ratio 3.53) • Metabolic syndrome (odds ratio 1.77) • Hypertension (odds ratio 1.33) 	HK	Predictors of urine abnormalities <ul style="list-style-type: none"> • Family history of diabetes or hypertension
		Thai	Independent predictors of CKD <ul style="list-style-type: none"> • Age 70 (odds ratio 7.34) • Diabetes mellitus (odds ratio 2.72) • History of kidney stone (odds ratio 2.72) • Hypertension (odds ratio 1.96) • Using traditional medicine (odds ratio 1.20) • Uric acid >0.33 mmol/L (odds ratio 2.87) • Female gender (odds ratio 1.70)
Mongolia	Independent predictors of proteinuria <ul style="list-style-type: none"> • Age 61 • Diabetes mellitus • Hypertension • Body mass index 25 • Family history of kidney disease 	ND	Independent predictors of CKD <ul style="list-style-type: none"> • Age >60 (odds ratio 29.49) • Diabetes mellitus (odds ratio 1.51) • Hypertension (odds ratio 1.74) • NSAID intake (odds ratio 1.34) • Female gender (odds ratio 1.53) • Education less than primary (odds ratio 1.31) • Obese by waist circumference (odds ratio 1.34)

04

Diabetes in Malaysia

1 in 5 adults in Malaysia have **diabetes**



That's about **3.9 million** people aged 18 years and above



OBESITI

1 daripada 2 dewasa di Malaysia adalah dalam kategori **berlebihan berat badan** atau **obes**



1 daripada 2 dewasa di M adalah dalam kategori **ob abdomen**



or **6.4 million people** in Malaysia have hypertension

05

Pressure rising: Hypertension in Malaysia



Untreated high blood pressure can lead to serious consequences such as heart attacks, strokes and other cardiovascular diseases



3 in 10

06

Keeping an eye on cholesterol



Having too much cholesterol in your blood stream will result in **cholesterol deposits** in the walls of your arteries, causing **heart disease**

Cholesterol is a type of fat that circulates in your blood

Raised total cholesterol is defined as a **total cholesterol level** of

5.2 mmol/L or higher



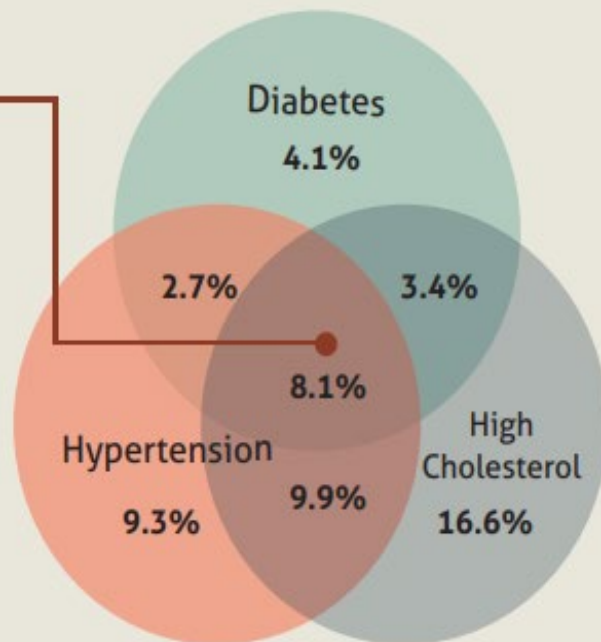
4 in 10

people or **8 million adults** in Malaysia have raised total cholesterol level

Fasting, improved discipline and self control from properly executed act of regular fasting could avoid or reduce or better control NCDS which in turn could reduce CKD

1.7 million people in Malaysia currently live with **three** major risk factors

3.4 million people in Malaysia currently live with **two** major risk factors



National Health and Morbidity Survey
MOH 2019

Regular Ramadan Fasting and CKD

- 1. Incidence and prevalence of CKD are not higher in Muslim majority countries**
- 2. Fasting is not listed as a cause of CKD in all reported prevalent studies in various regions globally**
- 3. Most countries include diabetes , hypertension and obesity as a cause of CKD which could be improved with acts of fasting**

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Effects of fasting on kidney function

- Reduced hydration – hemoconcentration-hypotension-reduced kidney perfusion
- Increased water reabsorption from glomerular filtrate by renal tubules
- Increased urinary concentration to preserve body fluids
- In abnormal kidneys – failure of urinary concentration mechanism (tubulo-interstitial kidney diseases) or if on diuretics , kidneys may continue to lose fluids and electrolytes
- Combination of continuous fluid and solute losses through urine and no fluid intake may lead to a state of dehydration
- In patients with ESKD with no effective urine output , only way of fluid losses are through the skin , bowel motion and dialysis procedure

Kidney and glucose regulation

- In normal circumstances urinary losses of glucose is minimal
- Certain diabetes medication will substantially increase urinary losses of glucose (eg empagliflozin, dapagliflozin, canagliflozin)
- Kidney (apart from liver) is also a site for gluconeogenesis (glucose production)
- Kidney (apart from liver) breaks down insulin
- Patients with kidney disease are at risk of low blood glucose due to combination of reduced glucose production and increased circulating insulin (due to reduced insulin breakdown) which further decreases blood glucose
- The more severe is the kidney disease, the higher will be the risk of hypoglycemia (low blood sugar)
- Many glucose lowering drugs (other than insulins) have increased half life –duration of action ,in patients with reduced kidney function, leading to cumulative action and increased risk of hypoglycemia
- The act of fasting in these conditions may further increase the risk and severity of hypoglycemia

Reasons for Variation in reported outcomes of fasting in ESRD patients in different studies

Published studies on clinical outcome of Ramadan fasting performed in UK, KSA , Egypt, Pakistan , Malaysia

- Differences in demography and case mix
- Variable sample size –mostly small numbers
- Differences in geography ,temperature and duration of fasting time
- Diversity in food and dietary habits
- Differences in duration- time of fasting in different regions and season
- Differences in outcome measures (fluid and electrolyte status, BP control, metabolic-biochemical status, nutritional status, glycemic status, hospitalization, survival etc

The Effects of Intermittent Fasting during the Month of Ramadan in Chronic Haemodialysis Patients in a Tropical Climate Country

[Wan Ahmad Hafiz Wan Md Adnan](#), ¹ · * [Nur Lisa Zaharan](#), ² [Mun Hoe Wong](#), ¹ and [Soo Kun Lim](#) ¹

Emmanuel A. Burdmann, Editor

N 35 : 18 non diabetic vs 17 diabetic

From 3 HD units

Observational , open label

Generally safe in clinical outcome

Benefit :

Significant increase in serum albumin level ($p=0.006$)

Significant decrease in serum phosphate level ($p=0.02$)

at the end of Ramadan compared to pre-Ramadan

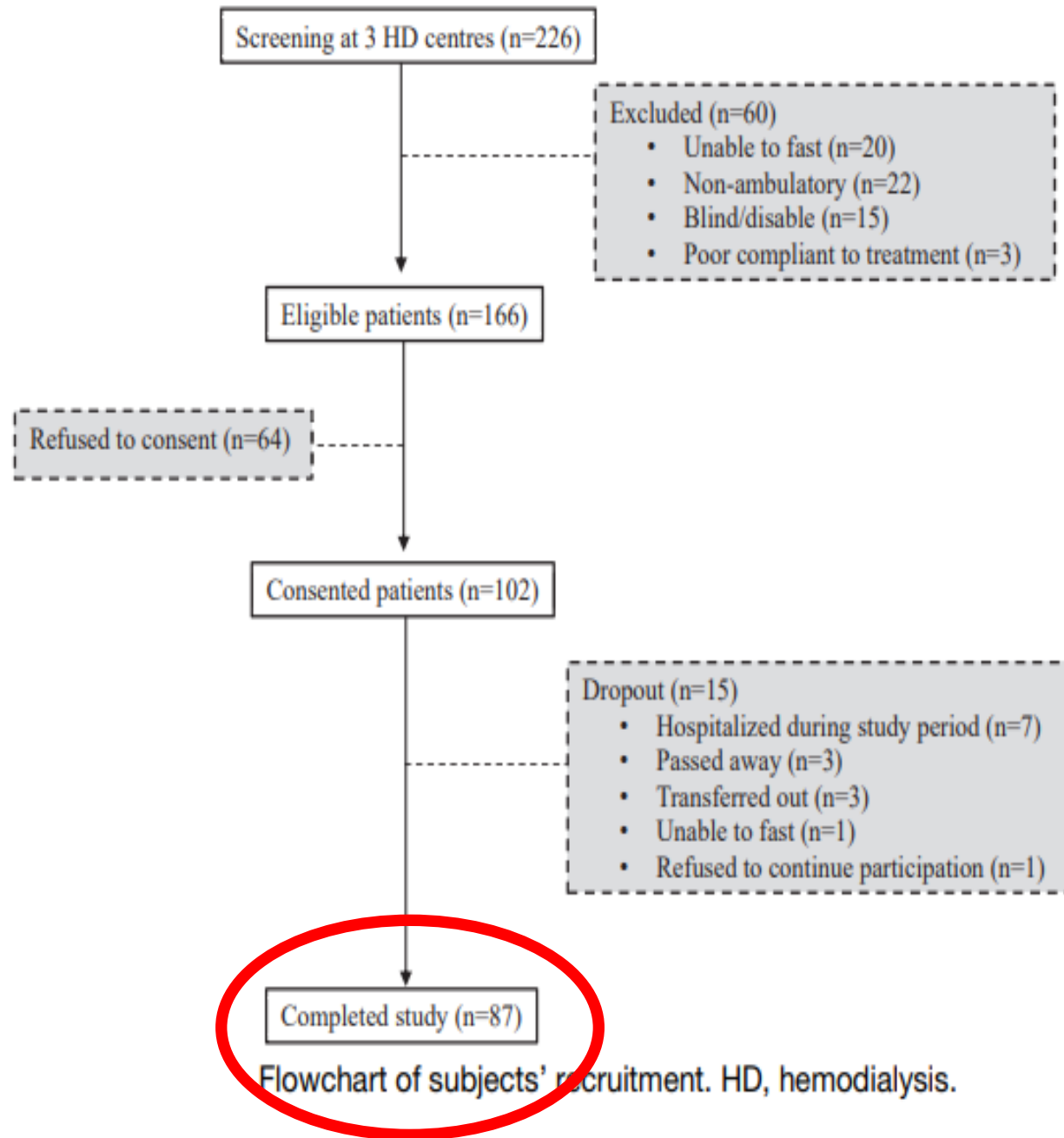
Investigating Physical and Nutritional Changes During Prolonged Intermittent Fasting in Hemodialysis Patients: A Prospective Cohort Study

Nurul Iman Hafizah Adanan, BSc, Mohamad Syafiq Md Ali, BSc,* Jun Hao Lim, BSc,* Nor Fadhlina Zakaria, MD, MMed,† Christopher Thiam Seong Lim, MBBch, MRCP, FAMS, FRCP,† Rosnawati Yahya, MBChB, MRCP, FRCP,‡ Abdul Halim Abdul Gafor, MBBS, MMed,§ Tilakavati Karupaiah, PhD, APD,¶ and Zulfritri 'Azuan Mat Daud, PhD, RDN**

87 HD patients from 3 HD centres in Klang Valley studied for 12 weeks

2 wks before Ramadhan (V0), 4 th weeks of Ramadhan (V1) and 4 weeks after Ramadhan (V2)

68 (78.2%) patients fasted \geq 20 days



Ramadan Fasting Practices (n = 87)

Ramadan fasting practices	Median (IQR)	Frequency (%)
Full fasting		
Yes		42 (48.3)
No		45 (51.7)
Number of fasting days	28 (8)	
<20 days		19 (21.8)
≥20 days		68 (78.2)
Frequency of missed fasting days		
Nondialysis day		17 (37.8)
Dialysis day		28 (62.2)
Causes for nonadherence to fasting		
Feeling fatigue		20 (44.4)
Feeling ill		11 (24.4)
Self-reported symptoms of hypoglycemia		7 (15.7)
Menstruation		5 (11.1)
Others		2 (4.4)

IQR, interquartile range.

Full fasting is defined as 29 days of fasting equivalent to 1 Islamic calendar month.⁴⁶

Common symptoms not tolerated while fasting in patients on HD :

- Hypoglycemic symptoms
- Tiredness (fatigue), sleepiness
- Feeling ill



Ramadan Fasting and Patients with Renal Disorders: A Literature Review

Naina Mohamed Pakkir Maideen*¹, Abdurazak Jumale¹

¹. Dubai Health Authority, Dubai, United Arab Emirates.

J Nutr Fast Health. 2021; 9(2): 98-104.

Impact of Ramadan Fasting on Renal Diseases

Renal Diseases	Author(s)	Outcomes
Chronic Kidney Disease (CKD)	Chowdhury et al. [14]	No significant changes in weight, blood pressure, creatinine, glycated haemoglobin (HbA1C), cholesterol and urinary protein-creatinine ratio (PCR) due to Ramadan fasting.
	Hassan et al. [16]	Significant elevation of serum urea levels and reduction of hydration status indices and plasma BNP levels which returned to normal after 4 weeks.
	Kara et al. [17]	Serum creatinine was elevated and estimated glomerular filtration rate (eGFR) was lowered in nonfasting patients with CKD compared to the CKD patients on Ramadan fasting.
	Bernieh <i>et al.</i> [18]	Reduction in the mean of body weight, systolic and diastolic blood pressure, triglycerides, and urinary protein excretion and an improvement in eGFR of patients with CKD who fasted during Ramadan.
	NasrAllah <i>et al.</i> [19]	Use of renin angiotensin aldosterone system (RAAS) blockers and diuretics were associated with increased serum creatinine at day 7 of fasting in CKD patients observing Ramadan fasting.
	Bakhit <i>et al.</i> [20]	Ramadan fasting in patients with CKD resulted in elevated creatinine levels, improvement in mean systolic blood pressure, significant reduction of HbA1c and improved diabetic control.

Renal Colic

- Miladipour et al. [22] Significant reduction of total excretion of calcium, phosphate, and magnesium in 24-hour urine and urine volume, significantly higher urine concentrations of uric acid, citrate, phosphate, sodium, and potassium and no significant increase in calcium oxalate supersaturation were noted in men observing Ramadan fasting.
- Cevik et al. [23] Ramadan fasting in patients with renal colic induced significant changes in some parameters such as hemoglobin, general crystal, and triple phosphate crystal values.
- Basiri et al. [24] The frequency of admissions due to renal colic was significantly higher in warm seasons and no significant difference in colder months in comparison with Ramadan.
- Al Mahayni et al. [25] The rate of urinary tract stones was higher in those over 40 years old and most of the urinary tract stones were formed in the ureter.
- Abdolreza et al. [27] and Sagy et al. [26] Hospital admissions due to renal colic were significantly higher during the first two weeks of Ramadan.
- Sagy et al. [26] The emergency department (ED) visits with renal colic was higher during summer and 2–4% in ED visits were increased for every increase in 1 °C.

Dialysis

- Al Wakeel et al. [28] The patients undergoing peritoneal dialysis did not experience any serious morbidity or deterioration in renal function during Ramadan fasting though hypotension and lower limb edema occurred in few patients. The study implied that most stable patients on peritoneal dialysis could fast during Ramadan with close monitoring of fluid and electrolyte balances.
- Imtiaz et al. [30] The serum albumin has been increased significantly and no significant changes seen in other parameters like body weight, blood pressure, serum potassium, and serum phosphorus in patients who were on maintenance dialysis during Ramadan fasting.
- Alshamsi et al. [31] The hemodialysis patients observing Ramadan fasting shown a significantly higher serum phosphorous while no changes in other parameters such as blood pressure; serum potassium, albumin and body weight.
- Khazneh et al. [33] Body weight and serum potassium have been increased in patients undergoing hemodialysis during Ramadan fasting.
- Imtiaz S et al. [35] The frequency of death among hemodialysis patients during Ramadan was higher compared to other months

**Kidney
transplant
recipients**

Bernieh et al. [36]	Significant elevation of serum levels of potassium in the recipients of kidney transplants during Ramadan fasting.
Abdalla et al. [37]	No statistical changes in urinary and serum biochemical parameters and hematocrit in the recipients of kidney transplants during Ramadan fasting.
Qurashi et al. [38]	No significant differences in serum creatinine and estimated glomerular filtration rate of the kidney transplants recipients during Ramadan fasting.
Boobes Y et al. [40]	No significant changes in body weight, blood pressure, kidney function tests, blood sugar, lipid profile, and cyclosporine levels of the kidney transplants recipients during Ramadan fasting.
Einollahi et al. [42]	No significant changes in estimated GFR, Creatinine clearance and other parameters like body weight, blood pressure, serum levels of blood urea nitrogen, creatinine, uric acid, blood glucose, electrolytes, lipids and hemoglobin of the kidney transplants recipients during Ramadan fasting.
Salem et al. [43]	No changes in the parameters like body weight, blood pressure, cyclosporine level, urine volume, mean serum levels of urea and creatinine and mean creatinine clearance of the kidney transplants recipients during Ramadan fasting.

Kandungan ceramah

- Beban penyakit buah pinggang (CKD)– Prevalen
- Faktor risiko penyakit buah pinggang dan peranan amalan berpuasa
- Kesan amalan berpuasa keatas pesakit buah pinggang
- **Mencegah komplikasi dikalangan pesakit CKD jika berpuasa**
- Rumusan

Risks to be avoided in CKD patients who are fasting

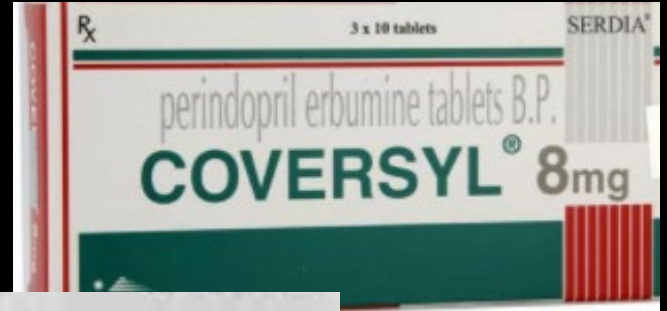
- Severe dehydration causing Acute kidney Injury
- Fluid overload in ESKD patient after breaking of fast
- Severe hyperkalemia , hyperphosphatemia
- Hypotension
- Hypoglycemia
- Severe lethargy and weakness
- Increased DRUG adverse effects with ACEi,ARBs,MRA, Diuretics,SGLT2-1

Summary of the potential risks that could occur with different classes of cardiac medication used while fasting

Drug	Condition used in	Risk in fasting
<p><i>Angiotensin Converting Enzyme inhibitor</i> e.g., Ramipril</p> <p><i>Aldosterone Receptor blockers</i> e.g., Candesartan</p> <p><i>Angiotensin Receptor Neprilysin Inhibitor (ARNI)</i> i.e., Sacubitril/Valsartan</p>	<p>Hypertension Heart failure</p>	<p>May worsen fasting associated hypotension, which may result in dizziness or loss of consciousness. May compound fasting-associated-dehydration resulting in an acute kidney injury and/or life-threatening electrolyte abnormalities e.g. hyperkalaemia.</p> <p>Medication non-compliance may result in uncontrolled hypertension, decompensated heart failure</p>

<p><i>Immunosuppressant therapy</i> e.g., Tacrolimus</p>	<p>Heart transplant</p>	<p>May compound fasting-associated-dehydration and result in an acute kidney injury and/or life-threatening electrolyte abnormalities e.g. hyperkalaemia.</p> <p>Medication non-compliance may result in organ rejection and death. Tacrolimus is taken twice a day and therefore care must be taken to avoid long periods in between</p>
<p><i>Loop diuretics</i> e.g., furosemide, bumetanide <i>Thiazide diuretics</i> e.g., Bendroflumethiazide</p>	<p>Hypertension Heart failure (HF)</p>	<p>May worsen fasting-associated-hypotension, which may result in dizziness or loss of consciousness. May worsen fasting-associated-dehydration resulting in an acute kidney injury and/or life-threatening electrolyte abnormalities e.g. hyperkalaemia.</p> <p>Medication non-compliance may result in uncontrolled hypertension, decompensated heart failure</p>
<p><i>Mineralocorticoid receptor antagonists (MRAs)</i> e.g., Spironolactone</p>	<p>Hypertension Heart failure</p>	<p>May worsen fasting-associated-hypotension, which may result in dizziness or loss of consciousness. May worsen fasting-associated-dehydration resulting in an acute kidney injury and/or life-threatening electrolyte abnormalities e.g. hyperkalaemia.</p> <p>Medication non-compliance may result in uncontrolled hypertension, decompensated heart failure</p>

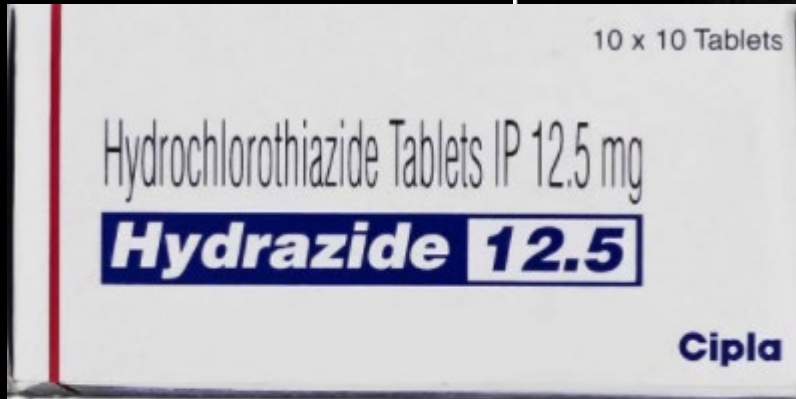
<p><i>Statins</i> e.g., Atorvastatin</p>	<p>Coronary artery disease / Myocardial infarction</p>	<p>Fasting associated dehydration may increase risk of acute kidney injury. This may compound a rare side effect of statins – rhabdomyolysis.</p>
<p><i>Sodium-Glucose co-Transporter-2 (SGLT2) inhibitors</i> e.g., Dapaglifozin</p>	<p>Heart failure Diabetes Mellitus</p>	<p>May worsen fasting-associated-hypotension, which may result in dizziness or loss of consciousness. May worsen fasting-associated-dehydration resulting in an acute kidney injury and/or life-threatening electrolyte abnormalities e.g. hyperkalaemia.</p> <p>Medication non-compliance may result in decompensated heart failure and cause/worsen hyperglycaemia in patients with diabetes mellitus.</p>



Frusemide 40mg



Bumetanide 1mg ,5 mg





Entresto sacubitril + valsartan



If fasting is undertaken in CKD patients

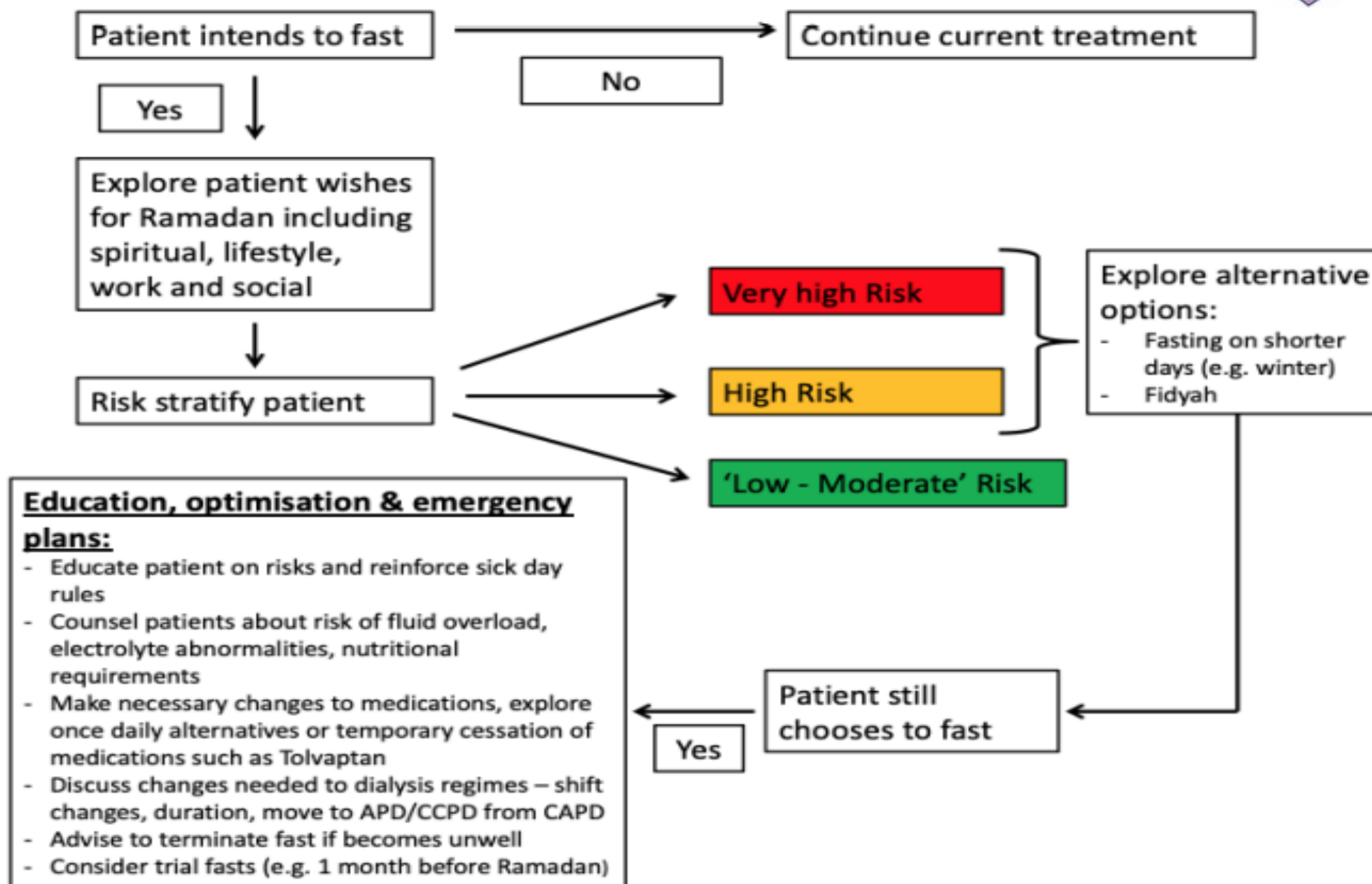
- Temporary change or temporary stopping of medication if necessary
- Changed timing of serving medication (diuretics, antihypertensives, hypoglycemic medications)
- Ensure adequate and appropriate intake of fluid at Sahur and Iftar (to avoid dehydration or fluid overload)
- Avoid unnecessary physical activities or heat exposure at daytime
- Re arrange timing of blood sample in kidney transplant patients
- Consider trial of full fasting pre Ramadan
- Consider alternate day fasting
- Break fast if severe exhaustion , lethargy, symptomatic hypotension and hypoglycemia occurs while fasting
- For pre dialysis CKD stage 5 , CKD stage 3-4, consider a blood test for renal profile within 1-2 week of Ramadan fasting and avoid further fasting if creatinine worsens $> 30\%$ of baseline

Kandungan ceramah

- Beban penyakit buah pinggang (CKD)– Prevalen
- Faktor risiko penyakit buah pinggang dan peranan amalan berpuasa
- Kesan amalan berpuasa keatas pesakit buah pinggang
- Mencegah komplikasi dikalangan pesakit CKD jika berpuasa
- **Rumusan**

Effects of Ramadan Fasting in patients on CKD

- For patients with mild CKD , fasting may be safe
- For more severe degree of CKD (stage 4,5) , new kidney transplant and those with impaired graft function , more health risks may be encountered. Fasting is either unsafe or discouraged. Decision to perform act of fasting should be individualized , in discussion with a clinician and carefully monitored for worsening kidney function, fluid & electrolyte abnormalities.
- Patients on regular dialysis treatment may fast based on individual general health fitness and general adherence to pre existing treatment prescriptions
- Changes in prescribed medications may be required with regard to timing and dosing



Must not fast

Should not fast

May fast in consultation with clinician

Diabetes ^a

One or more of the following:

- Severe hypoglycaemia within the 3 months prior to Ramadan ^b
- DKA within the 3 months prior to Ramadan
- Hyperosmolar hyperglycaemic coma within the 3 months prior to Ramadan
- History of recurrent hypoglycaemia
- History of hypoglycaemia unawareness
- Poorly controlled T1DM
- Acute illness
- Pregnancy in pre-existing diabetes or GDM treated with insulin
- Chronic dialysis or CKD stage 4 & 5
- Advanced macrovascular complications
- Old age with ill health
- Type 2 diabetes requiring insulin (MDI or mixed insulin) with no prior experience of safe fasting

One or more of the following:

- T2DM with sustained poor glycaemic control ^c
- Well-controlled T1DM
- Well-controlled T2DM on MDI or mixed insulin
- Pregnant T2DM or GDM controlled by diet only or metformin
- CKD stage 3
- Stable macrovascular complications
- Patients with comorbid conditions that present additional risk factors
- People with diabetes performing intense physical labour
- Treatment with drugs that may affect cognitive function
- Type 2 diabetes on SGLT-2 inhibitors (consider alternatives/stopping)*

Well-controlled T2DM treated with one or more of the following:

- Lifestyle therapy
- Metformin
- Acarbose
- Thiazolidinediones
- Second-generation SUs (moderate risk, regular SMBG advised)
- Incretin-based therapy (DPP-4 inhibitors or GLP-1 RAs)
- SGLT-2 inhibitors
- Basal Insulin (moderate risk, regular SMBG advised)

If patients wish to fast, they should be supported and should:

- Receive structured education

Abbreviations: CKD – chronic kidney disease; DKA – diabetic ketoacidosis; DPP-4 – dipeptidyl peptidase-4-; GDM – gestational diabetes mellitus; GLP-1 RA – glucagon-like peptide-1 receptor agonist; MDI – multiple dose insulin; SGLT-2 – sodium-glucose co-transporter 2; SMBG – self-monitoring of blood glucose; SU – sulfonylurea; T1DM – Type 1 diabetes mellitus; T2DM – Type 2 diabetes mellitus.

Notes:

^a In all categories, people with diabetes should be advised to follow medical opinion due to probability of harm. The decision to fast is a personal decision for the person with diabetes, who should be supported by the healthcare professional (HCP) to achieve best possible outcomes.

^b Hypoglycaemia that is not due to accidental error in insulin dose.

^c The level of glycaemic control is to be agreed upon between doctor and patient according to a multitude of factors. Consider HbA1c >75mmol/mol for over 12 months

* risk upgraded in light of covid-19 pandemic

Must not fast**Should not fast****May fast in consultation with clinician****Chronic kidney disease**

- CKD patients in stage 4-5 with eGFR<30 ml/min**

- CKD patients in stage 1-3 with unstable kidney function*

- CKD patients in stages 1-3 with stable kidney function

- Patients on all forms of hemodialysis and peritoneal dialysis
- Pregnant CKD patients
- CKD stage 3-5 patients with history of pre-existing cardiovascular disease
- CKD patients on tolvaptan

- CKD patients with known electrolyte abnormalities
- Patients at risk of dehydration due to fluid restriction requirements or need for diuretics
- Patients on ACE-I/ARB, SGLT2 inhibitors and mineralocorticoid receptor antagonists

- CKD patients prone to urinary tract infections or stone formation

CKD, Chronic Kidney Disease; ACE-I, Angiotensin Converting Enzyme inhibitor; ARB, Angiotensin Receptor Blocker; eGFR, estimated Glomerular Filtration Rate; SGLT2, sodium-glucose Cotransporter-2
 *unstable patients would include those with rapidly declining GFR, history of fluid overload and frailty.
 **although HD and PD patients would be considered very high risk, a select group may be able to fast following risk stratification and counselling, factors to consider would include – residual renal function, fluid balance, potassium >6.0 mmol/L, motivation, compliance with medical advice, consider alternatives to fasting and winter fasting.

Rheumatological disease

- Active SLE with renal involvement
- Active vasculitis with renal involvement
- Low eGFR secondary to connective tissue diseases/vasculitis
- Scleroderma leading to pulmonary hypertension

- Uncontrolled Gout
- Higher dose of steroids >20mg/day*

- Rheumatological conditions in remission e.g. rheumatoid arthritis, polymyalgia rheumatica, connective tissue diseases and vasculitis.
- Osteoarthritis
- Osteoporosis
- Sjogren's syndrome
- Well controlled gout

	Must not fast	Should not fast	May fast in consultation with clinician
Organ transplants	<ul style="list-style-type: none"> • Solid organ transplant recipients who underwent a transplant in the last 12 months • Patients on twice daily formulations of immunosuppression • Pregnant transplant patients • Transplant patients diagnosed with Post Transplant Diabetes Mellitus requiring twice daily oral hypoglycaemics or insulin treatment • Kidney transplant recipients with reduced kidney function (eGFR < 30 ml/min) • Patients with unstable graft function, recent rejection episodes and opportunistic Infections • Liver transplant recipients with unstable graft function, decompensated liver disease or evidence of cirrhosis on biopsy 	<ul style="list-style-type: none"> • Kidney transplant recipients with reduced graft function (eGFR 30-60ml/min) • Heart, lung, liver, small bowel, pancreas and multi-organ transplant recipients with reduced graft function • Patients at risk of dehydration due to fluid restriction requirements, need for diuretics or if they would be unable to meet their daily fluid intake requirement set by their transplant team 	<ul style="list-style-type: none"> • Transplant patients not in the other categories. We would advise patients to discuss the suitability of fasting and monitoring necessary with their relevant transplant teams

- **While Ramadan fasting is compulsory on those who fulfill the obligatory criteria, exceptions are granted in Islam for various conditions , one of which include ill health or a threat to health if fasting is performed. While many potential health benefits and rewards from our Creator may come with properly performed act of fasting , serious adverse effects , morbidity and mortality are definitely not included in the intended results of fasting either optional or obligatory**
- **Judgements to advise patient either to fast or skip Ramadan fasting are based on clinical risk assessment which is at the discretion of the advising clinician. The final decision to fast or not should be made by the individual patient, in light of the medical advice, in conjunction with advice from a trusted religious authority (where preferred) through a shared decision-making process.**

Terima Kasih