Personal & Societal Impact of Non-Eco-Friendly Dialysis: From crisis to opportunity!

Pr. Mohamed Ben Hmida
Department of Nephrology
Hedi Chaker University Hospital
Faculty of Medicine, University of Sfax,
Sfax, Tunisia

Introduction

- Non-eco-friendly dialysis isn't just a challenge for the healthcare system,
- It carries personal and societal ramifications that ripple far beyond the treatment room.
- Below is a few case practice-presentations and an in-depth look at how traditional, resource-intensive, and waste-generating dialysis practices can affect individuals and society,
- And became more and more of a burning topic.

- "A pessimist sees difficulty in every opportunity; an optimist sees the opportunity in every difficulty"

Key Personal Implications

Staff /Providers Emotional and Mental Stress

- Heat waves exacerbate unknown and undiagnosed CKD, leading to ESKD late referral, and announcing the KRT starting can be very stressful for both the patients and the renal care staff.
- The frequent occurrence of such presentations leads to burnout syndrome in young residents with specialty change requests and in young nurses with unit change requests.

Key Personal Implications

Staff /Providers Emotional and Mental Stress

- Knowing that working on a life-saving treatment contributes to broader environmental degradation can add to the emotional burden faced by renal care staff, compounding the psychological stress of managing a chronic condition.
- It is an opportunity to deconstruct the clichés that are the main barrier to early mental access to KRT and thus have the possibility of living an ordinary life for both, patients and renal care staff.

Key Personal Implications

A Couple's journey in Dialysis inspired change, but

- Fortunately, the wife donates a kidney to save her husband and *vice versa*.
- But sometimes, this setting may lead to divorce, homelessness, and even dialysis withdrawal.
- Wives are the most vulnerable.

Key Personal Implications

Impact on Overall Quality of Care

- Facilities that do not invest in sustainable, eco-friendly technologies may also have outdated practices or equipment, which might correlate with less optimal care outcomes.
- Improved eco-friendly systems often incorporate newer, more efficient technology that can enhance both treatment quality and safety.

Key Personal Implications

Indirect Health Effects through Environmental Impact

- Although non-green dialysis does not directly impair the clinical effectiveness of the treatment,
- the broader environmental degradation—such as pollution and strained local resources—can indirectly affect community health and, consequently, their well-being.

Key Personal Implications

Indirect Health Effects through Environmental Impact

- As was widely reported, 2023 and 2024 were the hottest years since scientists started recording global temperatures in the 1880s,
- and the past decade has been “the warmest 10 years since record-keeping began.”
- Years of warming and drought succession have led to a significant drop in dike water levels, the worst of which occurred in 2023.
- This situation has led to a drastic reduction, or even the cessation, of the drinking water supply to the entire Sfax region.

Key Societal Implications

Water Impact

- This critical situation for hemodialysis centers has justified the help of tankers and tractors to supply water from groundwater wells at high prices via unregulated markets, opening an **unexpected growth of an illegal water market.**
- The additional cost incurred by the hospital and dialysis facilities is substantial due to the enormous daily water quantities required.
- Besides the financial burden, this water scarcity implicitly reduced the length and number of dialysis sessions per patient.

Key Societal Implications

Water Impact

- What impact does water scarcity have on provision/access to dialysis?
  - Water stress and aridity contribute to the dialysis equity burden
  - Water scarcity in arid regions necessitates innovative approaches to sustainable management
- In many traditional setups, a significant portion of the water is discarded rather than recycled or repurposed, contributing to water scarcity concerns in regions where water is limited.

Key Societal Implications

Waste Impact

- Hemodialysis waste management has sometimes suffered from poor governance, with uncontrolled burial or incineration exposing the environment to potential infectious and pollution risks.
- To help solve and govern this problem, a logistic approach was settled with its financial burden allotted.

Key Societal Implications

Waste Impact

- How do operational and waste management costs impact dialysis provision?
- **Disposable materials:**
  - Many dialysis setups rely on single-use items such as dialyzers, tubing, and plastic packaging.
  - This leads to a large volume of plastic waste.
- **Disposal cost challenges:**
  - Medical waste must be handled carefully, often incinerated or sent to landfills.
  - Incineration can release harmful pollutants, while landfill disposal can contribute to long-term environmental contamination.

Key Societal Implications

Ethical and Equity Considerations

- Equity and Access: Resource Allocation
  - In regions with limited resources, the high environmental and financial costs of non-eco-friendly dialysis can exacerbate healthcare disparities.
  - This may result in unequal access to life-saving treatments, especially in low-income or resource-poor settings.
- Balancing Immediate Needs with Long-Term Sustainability: Ethical Dilemma
  - While dialysis is essential for patient survival, its environmental toll raises questions about long-term societal impacts.
  - The challenge is to balance the need for life-saving interventions with the responsibility to protect environmental and public health.

Key Societal Implications

Share and break the taboo of the impact of Death on caregivers

In Loving Memory of Henning Søndergaard

His legacy and dedication will continue to inspire us.

- People may not remember what you said.
  But they'll certainly remember how you treated them.
- We intertwined our own deaths as caregivers with those of our loved ones, our transgenerational deaths, and those of our family history.
- Our "coming out" is our vicarious trauma related to the death of our patients. (PTSD)
- It developed over the years by taking close care of our patients.

The wording in this slide carries emotional weight.

Key Societal Implications

Share and break the taboo of the impact of Death on caregivers

In Loving Memory of Henning Søndergaard

His legacy and dedication will continue to inspire us.

- With each patient where death manifests itself, we can see the distress of other patients and families
- and this brutal realization that medicine cannot make you immortal, that caregivers have limits, and that is when emotions arise uncontrollably.
- That violence can appear on both sides.
- With the driving element, the feelings and emotions are from the tolerable to the intolerable, from what we can hear to what we cannot hear.
- The problem is "to be a savior, but to forget oneself"
- Bravo and thanks to all the silent caregiver voices!

The wording in this slide carries emotional weight.

Conclusion

- Non-eco-friendly dialysis refers to dialysis practices that, while life-saving, rely on resource-intensive processes and generate significant waste.
- This situation creates a kind of “reciprocal” impact, meaning that the treatment meant to preserve life can also contribute to environmental harm, which in turn may affect personal, societal, and public health.
- **How Dialysis Facilities Face Resources Shortages and Environmental Challenges**?
- By learning how to transform everyday scarcity and difficulty into opportunity.

Exercise is the most transformative thing that you can do for your brain today.

Qualité de vie des insuffisants rénaux chroniques hémodialysés: à propos de 71 patients

Quality of life in chronic hemodialysis patients:about 71 cases

Lobna Zouari[1], Sana Omri[1], Sahar Turki[1], Manel Maâlej[1], Nada Charfi[1], Jihène Ben Thabet[1], Hichem Mahfoudh[2], Jamil Hachicha[2], Mohamed Maâlej[1].

1-Service depsychiatrie « C » CHU HédiChaker Sfax / Faculté demédecine de Sfax
2-Service de néphrologie CHU HédiChaker Sfax / Faculté de médecine de Sfax,

antioxidants

MDPI

Article

The Synergistic Effect of Intradialytic Concurrent Training and Melatonin Supplementation on Oxidative Stress and Inflammation in Hemodialysis Patients: A Double-Blind Randomized Controlled Trial

Houssem Marzougui [1,2], Imen Ben Dhia [2,3], Ines Mezghani [1,4], Rami Maaloul [1,2], Salma Toumi [5,6], Khawla Kammoun [5,6], Mohamed Nejib Chaabouni [5,6], Fatma Ayadi [1,4], Mohamed Ben Hmida [5,6], Mouna Turki [1,4] and Omar Hammouda [1,7,*]

1 Research Laboratory Molecular Bases of Human Pathology LR19ES13, Faculty of Medicine, University of Sfax, Sfax 3029, Tunisia; houssemmg1994@gmail.com (H.M.); mezghani.ines916@gmail.com (I.M.); rami.maaloulll@gmail.com (R.M.); ayadi_fatma@medecinesfax.org (F.A.); mouna.turki@gmail.com (M.T.)
2 High Institute of Sport and Physical Education of Sfax, University of Sfax, Sfax 3000, Tunisia; b.dimene@yahoo.com
3 Research Laboratory of Evaluation and Management of Musculoskeletal System Pathologies LR20ES09, Faculty of Medicine, University of Sfax, Sfax 3029, Tunisia
4 Biochemistry Laboratory, CHU Habib Bourguiba, University of Sfax, Sfax 3029, Tunisia
5 Nephrology Department, CHU Hedi Chaker, University of Sfax, Sfax 3029, Tunisia; toumisalma@rocketmail.com (S.T.); khawlakammoun2002@gmail.com (K.K.); nejib.cnh@planet.tn (M.N.C.); mohamed.benhmida.148@gmail.com (M.B.H.)

International Urology and Nephrology
https://doi.org/10.1007/s11255-020-02643-3

NEPHROLOGY - ORIGINAL PAPER

Melatonin ingestion before intradialytic exercise improves immune responses in hemodialysis patients

Houssem Marzougui[1,2] · Omar Hammouda[1,3] · Imen Ben Dhia[2,4] · Rami Maaloul[1,2] · Ikram Agrebi[5,6] · Hanen Chaker[5,6] · Khaoula Kammoun[5,6] · Mohamed Ben Hmida[5,6] · Fatma Ayadi[1,7] · Choumous Kallel[8] · Tarak Driss[3] · Mouna Turki[1,7] · Hatem Masmoudi[9,10] · Hend Hachicha[9,10]

Received: 2 May 2020 / Accepted: 7 September 2020

Abstract

Purpose The present study aimed to investigate the effects of melatonin (MEL) intake on systemic inflammation and immune responses during intradialytic exercise.

Methods Thirteen hemodialysis (HD) patients volunteered to participate in the current randomized-crossover study. Immunological responses were monitored in four HD sessions at different conditions: [Exercise (EX) + MEL], [EX + Placebo (PLA)], [Control (CON) + MEL] and [CON + PLA]. MEL (3 mg) or PLA was ingested 1 h before starting exercise or the equivalent time in CON condition. During all sessions, peripheral blood samples were collected to assess c-reactive protein, complete blood count, and immune cells phenotypes before HD (T0), immediately after exercise (T1) and 1 h after exercise (T2) or at corresponding times in the CON condition.

Results HD therapy induced a significant decrease in natural killer (NK) ($p = 0.001$, $d = 0.85$; $p < 0.001$, $d = 1.19$, respectively) and $CD8^+$ T-lymphocytes rates ($p = 0.001$, $d = 0.57$; $p < 0.001$, $d = 0.75$, respectively) at T1 and T2 compared to T0. MEL

Received: 27 October 2022 | Revised: 15 December 2022 | Accepted: 21 December 2022
DOI: 10.1111/1744-9987.13964

ORIGINAL ARTICLE

Therapeutic Apheresis and Dialysis

WILEY

Effects of intradialytic exercise in combination with melatonin supplementation on functional capacity, postural balance, and quality of life in hemodialysis patients

Houssem Marzougui[1,2] | Rami Maaloul[1,2] | Imen Ben Dhia[2,3] | Salma Toumi[4,5] | Khawla Kammoun[4,5] | Mohamed Ben Hmida[4,5] | Fatma Ayadi[1,6] | Mouna Turki[1,6] | Mohamed Habib Elleuch[3] | Sameh Ghroubi[3] | Omar Hammouda[1,7]

[1]Research Laboratory Molecular Bases of Human Pathology LR19ES13, Faculty of Medicine, University of Sfax, Sfax, Tunisia

IJAO The International Journal of Artificial Organs

Original research article

Melatonin intake before intradialytic exercise reverses oxidative stress and improves antioxidant status in hemodialysis patients

The International Journal of Artificial Organs
1–10

DOI: 10.1177/03913988231165324
journals.sagepub.com/home/jao
SAGE

Houssem Marzougui[1,2], Mouna Turki[1,3], Imen Ben Dhia[2,4], Rami Maaloul[1,2], Hanen Chaker[5,6], Rihab Makhlouf[1,3], Ikram Agrebi[5,6], Khawla Kammoun[5,6], Kamel Jamoussi[7], Fatma Ayadi[1,3], Mohamed Ben Hmida[5,6] and Omar Hammouda[1,8]

Abstract

Purpose: The present study aimed to investigate for the first time the effects of melatonin (MEL) intake on oxidative stress and cellular damage during intradialytic exercise (IEX).

Methods: Thirteen hemodialysis (HD) patients volunteered to participate in the current randomized crossover trial. Participants performed four HD sessions in four different conditions: (Exercise (EX)-MEL), (EX-Placebo (PLA)), (Control (C)-MEL), and (C-PLA). 3 mg of MEL or PLA were taken 60 min before starting exercise, or at the equivalent time in the C conditions. Blood samples were taken before HD (T0), immediately after the end of IEX (T1), 60 min after IEX (T2), or at the corresponding times in the C conditions to measure free radicals damage, antioxidant biomarkers, as well as biomarkers of muscle and liver damage.

Results: Malondialdehyde and Advanced Oxidation Protein Products decreased in (C-MEL) ($p < 0.05$, $d = 2.19$; $p < 0.01$,

Nocturnal Hemodialysis
"Healing by night to truly live by day."
"Restoring health at night to reclaim life by day."

- The virtuous cycle of long nocturnal dialysis is explored through the parallel of the unique training required for an ultra-trail race.
- Fabrice Huré, who undergoes long nocturnal dialysis, doesn’t let KF stop him from participating in numerous sporting events.
- He’s taken on an extraordinary challenge — especially remarkable for someone undergoing dialysis — by signing up for the legendary Diagonale des Fous on Réunion Island.
- He’s tackling the Trail du Bourbon: 112 km with 6,200 meters of elevation gain.

The wording in this slide carries empowring and motivational weight.

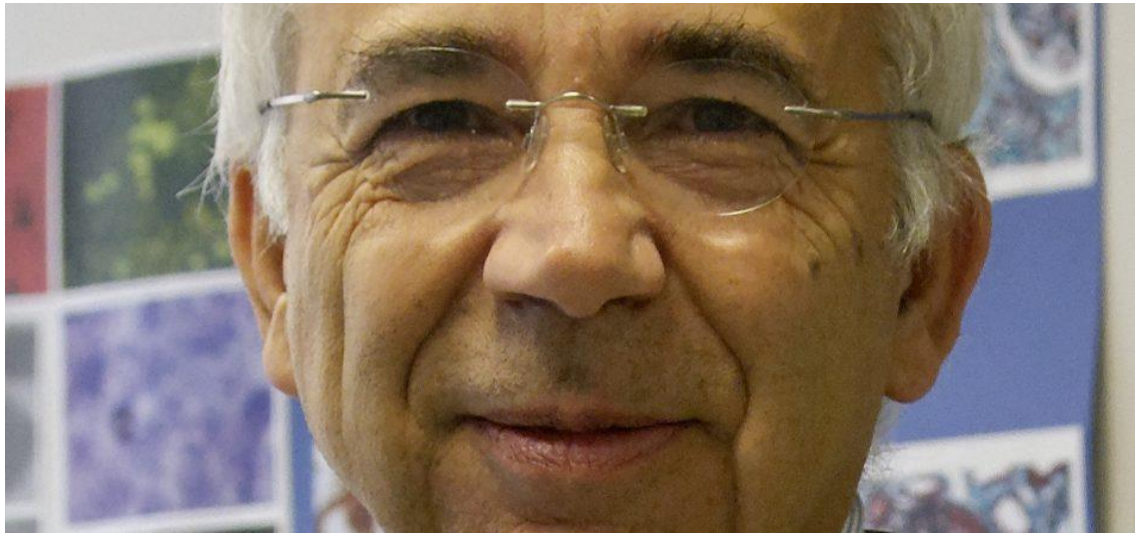
Nocturnal Hemodialysis
"Healing by night to truly live by day."
"Restoring health at night to reclaim life by day."

- Absolutely — the wording in the slide does have a strong, uplifting tone.
- It emphasizes resilience and determination in the face of adversity, which can inspire and motivate audiences.
- Highlighting Fabrice's perseverance despite undergoing nocturnal dialysis transforms a personal challenge into a powerful message of strength.

The wording in this slide carries empowring and motivational weight.

Acknowledgments and Dedications…

To the Soul of my late parents, who taught me about transforming everyday scarcity and difficulty into opportunities.



The wording in this slide carries empowring and motivational weight.
Réussir c’est travailler et lire pour s’émanciper et s’épanouir.


Thank you!