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Highlights

Health-Related Quality of Life

Social Participation of Older People

Discovering Thoughts, Inventing Future

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DISEASES
CANCER, OPHTHALMOLOGY & PEDIATRIC



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Health-Related Quality of Life and Social Participation of Older People with Hearing Loss and their Relatives

By Israel Bispo dos Santos, Perrine Morvan, Gloria Ravazzi, Lydia Redja,
Ana Cristina Guarinello & Adriana Lacerda

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Abstract- Introduction: Hearing loss is commonly associated with aging, occurring in around 60% of people over the age of 60. The impact of hearing loss can have consequences for the person themselves, but can also have collateral effects. Family members, especially spouses, often take on additional responsibilities, and family roles can be altered. Age-related hearing loss impacts daily life, quality of life and the role of caregivers.

Objective: To assess the impact of hearing aids on the quality of life and social participation of hearing-impaired elderly people and their families.

Methods: Systematic literature review using the CINHALL, Embase, Medline and Pubmed databases, with no age restriction.

Keywords: hearing loss, social participation, family, quality of life, aged.

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HEALTHRELATEDQUALITYOFLIFEANDSOCIALPARTICIPATIONOFOLDERPEOPLEWITHHEARINGLOSSANDTHEIRRELATIVES

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Health-Related Quality of Life and Social Participation of Older People with Hearing Loss and their Relatives

La Qualité De Vie Liée A La Santé Et La Participation Sociale Des Personnes Agées Souffrant De Perte Auditive Et De Leurs Proches

Israel Bispo dos Santos ^α, Perrine Morvan ^σ, Gloria Ravazzi ^ρ, Lydia Redja ^ω, Ana Cristina Guarinello [¥] & Adriana Lacerda [§]

Abstract- Introduction: Hearing loss is commonly associated with aging, occurring in around 60% of people over the age of 60. The impact of hearing loss can have consequences for the person themselves, but can also have collateral effects. Family members, especially spouses, often take on additional responsibilities, and family roles can be altered. Age-related hearing loss impacts daily life, quality of life and the role of caregivers.

Objective: To assess the impact of hearing aids on the quality of life and social participation of hearing-impaired elderly people and their families.

Methods: Systematic literature review using the CINAHL, Embase, Medline and Pubmed databases, with no age restriction.

Results: Of the 278 articles retrieved from the various databases, 18 studies met the inclusion criteria. These included cross-sectional, observational, longitudinal, prospective cohort and one randomized trial.

Conclusion: This review highlights the impact of age-related hearing loss on the quality of life of hearing impaired subjects and their families.

Keywords: hearing loss, social participation, family, quality of life, aged.

Abstract- Introduction: La déficience auditive est couramment associée au vieillissement et survient chez environ 60 % des personnes de plus de 60 ans. L'impact de la perte auditive peut avoir des conséquences sur la personne elle-même, mais peut également avoir des effets collatéraux. Les membres de la famille, et en particulier les conjoints, assument souvent des responsabilités supplémentaires, et les rôles familiaux peuvent être modifiés. La perte auditive liée à l'âge impacte la vie quotidienne, la qualité de vie des sujets et le rôle des proches aidants.

Objectif: Evaluer l'impact de l'appareillage sur la qualité de vie et la participation sociale de la personne âgée malentendante et de ses proches.

Méthodes: Revue systématique de la littérature à partir des banques de données CINAHL, Embase, Medline et Pubmed, sans limitation d'ancienneté.

Résultats: Sur les 278 articles extraits des différentes bases de données, 18 études répondaient aux critères d'inclusion. Ces articles incluent des études transversales, observationnelles, longitudinales, de cohorte prospective et un essai randomisé.

Conclusion: Cette revue met en évidence l'impact de la perte auditive liée à l'âge sur la qualité de vie des sujets déficients et de leurs proches. De nombreux facteurs peuvent avoir des effets protecteurs ou aggravants de l'audition. L'appareillage est considéré comme bénéfique au sein d'un dyad.

Mots clés: qualité de vie, participation sociale, perte auditive, personnes âgées, proches, appareils auditifs.

1. INTRODUCTION

La perte auditive liée l'âge (PALA) – ou presbycusie – est une maladie chronique courante chez les personnes du troisième âge, et est généralement liée au vieillissement naturel. Ce handicap invisible affecte plus de 250 millions de personnes dans le monde. La prévalence de la perte auditive augmente progressivement avec l'âge, passant de 13 % des adultes âgés de 50 à 59 ans à plus de 80 % des personnes âgées de 80 ans et plus. Plusieurs défis découlent de cette évolution démographique et doivent être pris en compte pour améliorer la qualité de vie liée à la santé (QVLS) des personnes âgées.

On constate plus généralement les impacts de la PALA aux niveaux physique, mental et social d'une personne. Cela peut conduire à des déficits cognitifs, des troubles de l'humeur, à un isolement social progressif et à une augmentation du risque de chutes et de blessures. La vie sociale et familiale ainsi que la propre qualité de vie des individus se voit alors affectée. La PALA influence également le comportement des proches dans la vie quotidienne, en particulier celui du principal aidant familial. Les proches doivent faire plus d'efforts pour communiquer avec la personne malentendante, en répétant, en parlant plus lentement et plus fort, et en se rapprochant d'elle pour être entendus et attirer son attention. De plus, les proches aidants font état d'anxiété et de stress, de limitations au niveau de la communication verbale, de changements

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dans les activités sociales, ou encore d'évitement de réunions sociales. En effet, les activités agréables, telles que aller au restaurant, au théâtre, rendre visite à des amis ou de la famille, peuvent être restreintes ou abandonnées car la communication est difficile. Des sentiments d'isolement, de frustration, de ressentiment et de culpabilité réduisent finalement leur propre qualité de vie. Le proche ressent cette perte de lien social qui ne dépend pas de lui.

Certaines études ont par ailleurs examiné l'impact positif de l'utilisation d'aides auditives (AA) sur la qualité de vie, le handicap, l'amélioration de la santé physique, et le déclin cognitif. Une minorité -12 % - des Canadiens malentendants utilisent des aides auditives. Même à des âges plus avancés, le pourcentage reste relativement faible, avec seulement 24 % des 70-79 ans étant équipés. Mettre un AA ne guérit pas la perte auditive mais permet d'aider dans différentes situations comme les conversations en tête à tête ou pour la télévision. L'appareillage est un dispositif bénéfique aussi bien pour les sujets que pour leur entourage.

En raison de toutes les conséquences que la presbycusie entraîne dans la vie des personnes âgées, il est inévitable que ce changement interfère avec leur qualité de vie globale, et puisse causer diverses frustrations. Il est important d'étudier comment les proches et les sujets atteints de PALA gèrent les problèmes de la vie quotidienne et comment la capacité à faire face aux difficultés influe réellement sur leur qualité de vie.

L'objectif de ce travail est d'évaluer, par une revue systématique de la littérature, si une aide auditive contribue à une meilleure qualité de vie et une meilleure participation sociale chez la personne âgée malentendante et ses proches.

II. MÉTHODES

a) Stratégie de recherche

Nous avons effectué une revue systématique de la littérature internationale à partir des banques de données CINAHL, Embase, Medline et Pubmed, sans limitation d'ancienneté.

Pour nous aider à définir les mots clés pour la recherche dans les différentes bases de données, nous avons utilisé la méthode PICO:

- Population: personnes âgées malentendantes et leur proche
- Intervention: utilisation d'amplification
- Comparaison: aucune intervention
- Outcome: qualité de vie et participation sociale

Pour interroger CINAHL, nous avons utilisé les mots-clés et termes suivants:

(((MH "Hearing Disorders") OR (MH "Presbycusis")) OR TI (presbycusis or hearing loss or hearing impairment or hard of hearing or hearing disorders) OR AB (presbycusis or hearing loss or hearing impairment or hard of hearing or hearing disorders)] AND [((MH "Quality of Life") OR (MH "Activities of Daily Living") OR (MH "Social Participation") OR (MH "Quality-Adjusted Life Years")) OR TI (quality of life or livingN2(standard or condition) or social participation) OR AB (quality of life or livingN2(standard or condition) or social participation) OR MW (quality of life or living N2 (standard or condition) or social participation)] AND[(MH "Aged") OR TI (aged or elderly or senior or older people) OR AB (aged or elderly or senior or older people) OR MW (aged or elderly or senior or older people)] AND [((MH "Caregivers") OR (MH "Extended Family") OR (MH "Significant Other")) OR TI (caregiver or extended family or significant other or family member or communication partner or loved one or immediate family or near relative or partner) OR AB (caregiver or extended family or significant other or family member or communication partner or loved one or immediate family or near relative or partner) OR MW (caregiver or extended family or significant other or family member or communication partner or loved one or immediate family or near relative or partner)] AND [(MH "Hearing Aids") OR TI hearing aids OR AB hearing aids OR MW hearing aids].

disorders) OR AB (presbycusis or hearing loss or hearing impairment or hard of hearing or hearing disorders) OR MW (presbycusis or hearing loss or hearing impairment or hard of hearing or hearing disorders)] AND [((MH "Quality of Life") OR (MH "Activities of Daily Living") OR (MH "Social Participation") OR (MH "Quality-Adjusted Life Years")) OR TI (quality of life or livingN2(standard or condition) or social participation) OR AB (quality of life or livingN2(standard or condition) or social participation) OR MW (quality of life or living N2 (standard or condition) or social participation)] AND[(MH "Aged") OR TI (aged or elderly or senior or older people) OR AB (aged or elderly or senior or older people) OR MW (aged or elderly or senior or older people)] AND [((MH "Caregivers") OR (MH "Extended Family") OR (MH "Significant Other")) OR TI (caregiver or extended family or significant other or family member or communication partner or loved one or immediate family or near relative or partner) OR AB (caregiver or extended family or significant other or family member or communication partner or loved one or immediate family or near relative or partner) OR MW (caregiver or extended family or significant other or family member or communication partner or loved one or immediate family or near relative or partner)] AND [(MH "Hearing Aids") OR TI hearing aids OR AB hearing aids OR MW hearing aids].

Pour interroger OVID (Embase et Medline), nous avons utilisé les mots-clés et termes suivants :

(((MH "Hearing Loss") OR (MH "Presbycusis")) OR TI (presbycusis or hearing loss or hearing impairment) OR AB (presbycusis or hearing loss or hearing impairment) OR MW (presbycusis or hearing loss or hearing impairment)) AND [((MH "Quality of Life") OR (MH "Social Participation")) OR TI (quality of life or living condition or social participation) OR AB (quality of life or living condition or social participation) OR MW (quality of life or living condition or social participation)] AND [((MH "Aged") OR (MH Adult)) OR TI (aged or elderly or senior or older) OR AB (aged or elderly or senior or older) OR MW (aged or elderly or senior or older)] AND [((MH "Caregivers") OR (MH "Spouses") OR (MH "Child of impaired parents")) OR TI (caregiver or significant other or family member or communication partner) OR AB (caregiver or significant other or family member or communication partner) OR MW (caregiver or significant other or family member or communication partner)] AND [(MH "Hearing Aids") OR TI (hearing aids) OR AB (hearing aids) OR MW (hearing aids)].

Cette recherche nous a permis d'identifier 278 articles, qui ont ensuite été importés sous Covidence. Nous avons éliminé les 94 doublons des différents moteurs de recherche. Un premier tri a été effectué après lecture des titres et des abstracts. Les articles complets ont ensuite été évalués selon les critères d'inclusion et d'exclusion.

b) *Sélection des articles*

Les critères d'inclusion pour les articles comprenaient des articles révisés par les pairs, avec des sujets presbycusiques (perte neurosensorielle) âgés d'au moins 60 ans, incluant des proches (membres de la famille, amis, professionnels de santé permanents), un groupe contrôle ou de comparaison et utilisant des échelles psychométriques et des questionnaires validés. Concernant le plan d'étude, les essais randomisés contrôlés, les interventions contrôlées non-randomisées et les méta-analyses étaient acceptées.

Tout article avec sujets ayant des troubles de la communication, déficit cognitif, syndrome congénital, maladie de Ménière et autres comorbidités étaient exclus. De même, les aides de suppléance à l'audition, implant cochléaire ou à ancrage osseux n'étaient pas pris en compte, tout comme les pertes auditives conductives, rétrocochléaires ou liée à l'exposition au bruit. Les études observationnelles, revues systématiques et littérature grise étaient également exclues. Les proches considérés comme professionnel de la santé temporaire n'étaient pas non plus éligibles pour cette revue.

c) *Extraction des données*

Chaque article était analysé par deux évaluateurs à l'aide du logiciel Covidence. Les conflits ont été gérés par une troisième personne.

d) *Risque de biais (Risk of bias)*

La méthodologie des études sélectionnées a été évaluée à l'aide du Joanna Briggs Institute Meta-Analysis of Statistics Assessment and Review Instrument (JBI-MAStARI), un outil permettant d'évaluer le risque de biais. Le risque de biais a été classé comme "élevé" lorsque l'étude avait un score "oui" inférieur à 49 % ; "modéré" lorsque l'étude avait un score entre 50 et 69 % de "oui" ; et "faible" lorsque l'étude avait plus de 70 % de scores "oui" pour les questions relatives au risque de biais. Ces jugements ont été réalisés par deux évaluateurs indépendants. Les désaccords ont d'abord été résolus par la discussion et, lorsqu'il n'y avait pas de consensus, le troisième examinateur a été consulté pour le vote décisif.

e) *Qualité de preuve (Quality of evidence)*

Le groupe *Grading of Recommendations Assessment, Development, and Evaluation* (GRADE) a développé un système pour évaluer la qualité des preuves et mesurer la force des recommandations dans les revues systématiques. Elle sera utilisée ici en complément de la méthode MASTARI.

première sélection basée sur la lecture des titres et des abstracts nous a permis d'éliminer 144 articles. Après lecture complète des 37 articles restant, 19 études ont de nouveaux été exclues. 11 d'entre elles avaient un mauvais plan d'étude, 6 articles ne correspondaient pas aux populations adéquates, 1 article était rédigé en allemand, et le dernier utilisait une mauvaise intervention. 18 études sont finalement incluses dans notre revue systématique et leurs caractéristiques sont référencées dans la Table 1 (Annexe 1).

III. RÉSULTATS

a) *Résultats de la recherche et caractéristiques*

Notre recherche dans les 4 bases de données nous ont permis d'identifier 278 articles (Fig. 1). Une

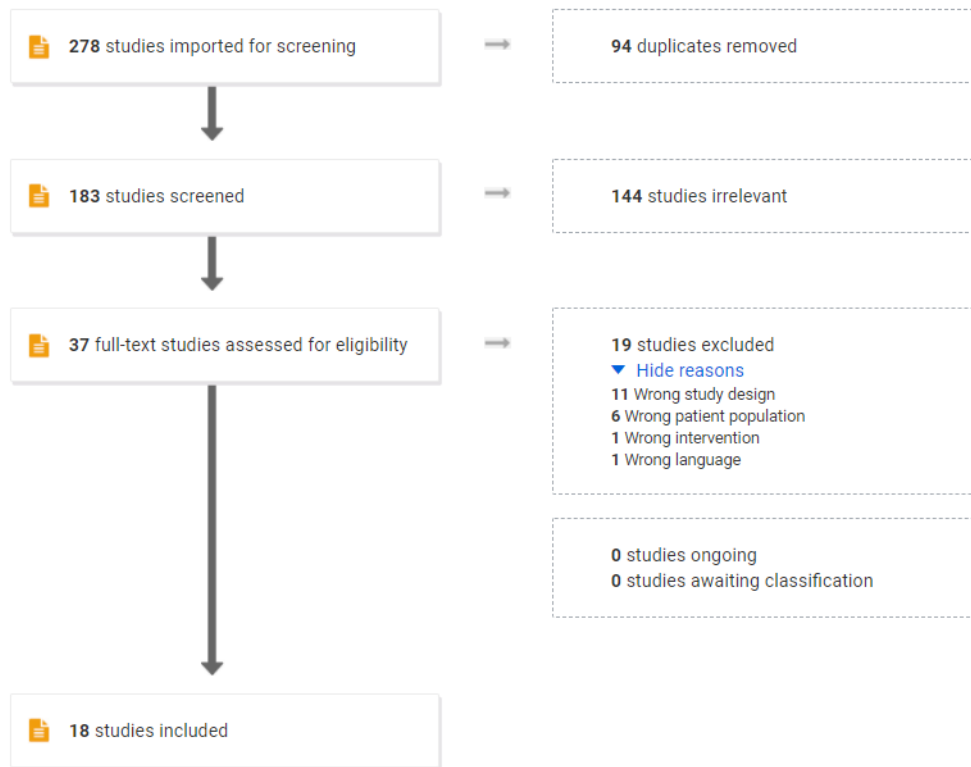


Figure 1: Strategie De Selection Des Articles

b) Modèle des études

Sur les 18 études sélectionnées, 12 sont des études transversales [1-12]. Quatre études sont longitudinales [13-16] et une est de cohorte prospective [17]. On note enfin un essai randomisé [18].

c) Evaluation de l'audition

L'audition a été évaluée par différentes méthodes, aussi bien avec des audiométries tonales classiques afin d'évaluer les seuils auditifs [4-6, 8-11, 13, 15, 16] qu'à l'aide de questionnaires d'auto-évaluation de l'audition [1, 3, 12] ou via la lecture de dossiers médicaux [17]. Quelques audiométries vocales dans le silence [16] ou dans le bruit ont aussi été utilisées comme le QuickSIN [5, 10]. Quatre études n'ont pas décrit les méthodes audiométriques utilisées. Dans tous les cas, des aides auditives étant utilisées ou l'impact de la perte auditive étant caractérisée, il est présumé qu'une déficience auditive significative a été supposée [2, 7, 14, 18].

d) Effet de l'appareillage

Concernant la réhabilitation auditive, les études menées ici ont choisi différentes approches. Soit la population sélectionnée comprenaient des sujets aussi bien appareillés que non appareillés [1, 2, 6, 8-11, 15, 18], soit une population de sujets non appareillés et équipés ensuite par l'équipe de recherche [13, 14, 16].

Dans les études où les sujets appareillés et non appareillés sont recrutés, il est difficile de tirer des

conclusions unanimes. En effet, le taux de sujets appareillés est souvent trop faible [1] et un manque d'information sur l'appareillage (nombre d'appareils portés, temps de port, gain prothétique) [2, 6, 8, 9] empêchent de conclure à des résultats satisfaisants. Cependant, on remarque tout de même que l'appareillage améliore la qualité de vie et semble avoir un impact positif sur le processus de vieillissement, et que la qualité de vie dépend des stratégies d'adaptations utilisées au sein du dyad.

Dans les études longitudinales, les effets sont plus marqués. Après l'appareillage, une amélioration générale de la qualité de vie, une diminution du stress des proches aidants et des difficultés de façon générale sont observées. Cependant, la taille des échantillons pour ces études reste faible et les tests utilisés ne sont pas forcément standardisés [14, 16].

Les autres études n'ont pas évalué l'effet de l'appareillage en tant que tel [3-5, 7, 17]. Cependant, elles se sont intéressées à l'impact de la perte auditive sur les proches ou les facteurs pouvant influencer la qualité de vie des sujets malentendants et des proches. Les effets seront décrits plus bas.

e) Interventions complémentaires

Pour évaluer la qualité de vie, plusieurs questionnaires ont été utilisés : le World Health Organization Quality of Life Instruments (WHOQOL-BREF) [2, 8, 9], le Short Form-36 (SF-36) [13, 16], l'EuroQoL-5D (EQ-5D-3L) [3] et le International Outcome

Inventory Hearing Aids (IOI-HA) ou Alternative Interventions (IOI-AI) [18]. Le International Outcome Inventory for the Significant Others (IOI-HA-SO and IOI-AI-SO) [18] a été administré pour les proches uniquement. Pour le reste des études, beaucoup de questions « faites maison » [5, 17] ou inspirées de questionnaires déjà existants comme le Global Age-Friendly Cities : a Guide [1] ou le questionnaire de Silliman [17] ont été appliqués afin d'évaluer ce paramètre.

Pour déterminer l'impact de la perte auditive sur la vie les sujets malentendants, la majorité des articles ont optés pour le Hearing Handicap Inventory for the Elderly (HHIE-S) [2, 4-6, 10, 12, 16] ou pour des questions d'auto-évaluation de l'audition [1]. Le ressenti des proches a été quantifié à l'aide du Hearing Handicap Inventory for the Significant Other/Partner (HHIE-SO/SP) [4, 6, 10], du Significant Other Scale for Hearing Disability (SOS-HEAR) [11, 12, 15], du Significant Other Assessment of Communication (SOAC) [11] ou du Quantified Denver Scale (QDS)[16].

Des questionnaires supplémentaires ont aussi été administrés pour évaluer les symptômes dépressifs (Center for Epidemiological Studies-Depression Scale, CES-D), les comorbidités (Cumulative Illness Rating Scale, CIRS), le niveau de dépendance fonctionnelle (Katz Index of Independence in Activities of Daily Living, ADL ou le Lawton Instrumental Activities of Daily Living Scale, IADL) [13], ou encore les troubles cognitifs et auditifs centraux (Dichotic Sentence Index, DSI test)[4] des sujets malentendants. Des échelles analogiques pour évaluer l'état de santé (EuroQol-Visual Analogue Scale, Chen et al, 2020), l'anxiété ou l'humeur d'une personne [8] sont également employés.

Pour les proches aidants, des caractéristiques autres que la qualité de vie et ont été analysées dans les articles. Le stress de la vie quotidienne est mesuré par le Caregiver Burden Inventory (CBI)[13], le Zarit Burden Interview (ZBI) [7], et le Perceived Stress Scale (PSS) [10]. De plus, les difficultés de communication au sein du couple (Primary Communication Inventory – PCI), l'humeur (The Philadelphia Geriatric Center Positive and Negative Affect Rating Scale – ARS)[10], et l'impact de la perte auditive sur les activités quotidiennes (Relationship Assessment Scale – SAC)[11] ont aussi pu être caractérisées.

Quelques études ont utilisé leurs propres échelles, qui n'ont pas été validées, ou se sont inspirés de questionnaires déjà existants [1, 5, 14, 17].

f) *Risques de biais et qualité de preuve*

Les analyses pour cette partie ne sont pas terminées à l'heure où le rapport est écrit. Elles seront effectives d'ici à la fin du mois de Septembre 2021.

g) *Résumé des articles*

A la lecture des différents articles, plusieurs points peuvent être relevés. La perte auditive a des

conséquences aux niveaux émotionnel et social [5, 9], mais aussi sur la communication [5, 11]. De plus, une charge mentale plus importante des proches est observée [7].

Aussi, il est clair que l'appareillage a un impact sur la qualité de vie générale des sujets et de leur entourage. Dans les papiers sélectionnés ici, il a été démontré que l'appareillage améliore la qualité de vie [2, 13, 16], permet de diminuer le stress des proches aidants [13, 14], les symptômes dépressifs [13], ainsi que la charge émotionnelle et mentale aussi bien des sujets que de leurs proches aidants [7, 14]. De plus, une amélioration de la conversation en tête à tête et à la télévision [14] est aussi relevée.

En outre, plusieurs facteurs ont été étudiés et caractérisés comme ayant une influence sur le taux de plainte auditive. Un plus haut niveau d'éducation scolaire (chaque année supplémentaire d'étude diminuerait de 3% de chance le risque de se plaindre de problèmes auditifs), avoir reçu des soins de santé dans les 6 derniers mois, être marié [1] et ne pas avoir de diagnostic de démence [7] seraient des facteurs protecteurs sur l'acceptation d'une perte d'audition.

A contrario, des facteurs de risques existent, qui augmenteraient quant à eux les chances de se plaindre de l'audition. Un âge plus avancé (chaque année supplémentaire augmenterait de 6% de chance le risque de se plaindre), être un homme (les hommes ont 19% de plus de chances de se plaindre de leur audition que les femmes) [1, 7], le niveau de revenus et de participation sociale [1, 10] et le statut marital, à savoir être célibataire ou veuf, [1] sont des facteurs de risque relevés dans cette revue. De plus, d'autres paramètres peuvent aussi impacter la qualité de vie des sujets. Un IMC élevé, ne pas consommer d'alcool ou de drogues, vivre avec des membres de la famille, avoir un bon sommeil et de bonnes relations sociales et familiales, ne pas avoir de déficience auditive ou visuelle, avoir peu de maladies chroniques [3], avoir des loisirs [3, 10], une perte auditive légère [6], et utiliser des stratégies d'adaptation actives basées sur la résolution de problèmes et la pensée positive [8, 9] impactent les caractéristiques psychosociales des individus [10].

Concernant la perception de l'audition, il n'y a pas de consensus dans la littérature. Dans la revue de Chmiel et al (1993), les proches jugent plus sévèrement l'impact de la perte auditive que les patients. Dans le papier de Kelly et al (2011), le sujet malentendant rapporte cette fois-ci un score total et émotionnel plus élevé que celui du proche. De façon générale, il est clair que les pensées négatives impactent grandement les sujets dans leur jugement de la perception de la qualité de vie liée à l'audition [10].

Enfin, certaines études ont aussi pris plus spécifiquement en compte le ressenti des proches, et ont évalué les facteurs de risques pouvant augmenter leur stress. Il a été remarqué que le stress des proches

aidants est plus élevé si le proche en question est une femme en mauvaise santé et s'occupant au moins 8 heures par jour de leur conjoint. Ce stress peut être diminué si la perte auditive ou la dépression du conjoint sont traités [17]. Par ailleurs, la satisfaction au sein du couple, l'écart d'âge et la perception du handicap auditif par le conjoint [11] sont aussi des facteurs pouvant influencer le stress du proche aidant. L'âge, le sexe ou le degré de perte auditive ne semblent pas avoir d'effets sur les scores de perception du handicap auditif entre les sujets déficients auditifs et les proches [6].

IV. DISCUSSION

La perte auditive liée à l'âge a un effet délétère sur la communication orale, en particulier en présence de bruits de fond, et peut amener les sujets malentendants à se mettre en retrait de leurs activités quotidiennes. Par ailleurs, il est important de noter que la PALA n'affecte pas seulement la personne ayant une perte auditive : elle peut aussi avoir un effet délétère sur les proches. Parmi ces effets, nous constatons une réduction de la participation sociale, une estime plus faible de son propre bien-être, moins d'interactions, une communication de moins bonne qualité, des symptômes plus importants d'anxiété et de dépression et moins de relations interpersonnelles ou conjugales. Peu de chercheurs ont enquêté sur les effets de l'utilisation d'aides auditives sur les proches.

Il a donc été choisi de réaliser une revue systématique de la littérature afin d'évaluer, dans les études récentes, l'impact que pourrait avoir une aide auditive sur la qualité de vie et la participation sociale de la personne âgée malentendante et de ses proches.

Dans les papiers sélectionnés ici, il a été démontré que l'appareillage améliore la qualité de vie, mais permet aussi de diminuer le stress, les symptômes dépressifs ainsi que la charge émotionnelle et mentale aussi bien des sujets que des proches aidants. Certains facteurs sont protecteurs du taux de plainte auditive, comme un plus haut niveau de scolarité, avoir reçu des soins de santé dans les 6 derniers mois, être marié et ne pas avoir de diagnostic de démence. Un IMC élevé, ne pas consommer d'alcool ou de drogues, vivre avec des membres de la famille, avoir un sommeil de qualité, garder de bonnes relations sociales et familiales, ne pas avoir de déficience auditive (ou une perte légère) ou visuelle, avoir peu de maladies chroniques, continuer de pratiquer des loisirs et utiliser des stratégies d'adaptation actives basées sur la résolution de problèmes et la pensée positive impactent positivement les caractéristiques psychosociales des individus.

Cependant, d'autres facteurs sont considérés comme plus à risque, ou influençant la qualité de vie liée à l'audition des sujets et de l'entourage. Un âge plus avancé, être un homme, le niveau de revenus et de participation sociale, et le statut marital (être célibataire

ou veuf) sont des facteurs de risque relevés dans cette revue.

Concernant la perception de l'audition, aucun consensus n'a été trouvé dans cette revue. Dans certains papiers, les proches sont plus impactés par le handicap de leur conjoint, tandis que dans d'autres, les sujets déficients auditifs ont des taux de satisfaction moins élevés que leurs partenaires. La façon de penser et de gérer le handicap impactent grandement les sujets dans leur jugement de la perception de la qualité de vie liée à l'audition. Malgré cette absence d'harmonie dans les études sélectionnées ici, il est manifeste qu'évaluer le handicap auditif par des proches est primordial afin de mieux comprendre les problèmes de communication avec le sujet âgé [12].

Enfin, des facteurs de risque impactent également le stress des proches aidant. Une mauvaise satisfaction au sein du couple, un grand écart d'âge, être une femme, avoir une santé fragile, et s'occuper au moins 8 heures par jour de son conjoint augmente le taux de stress et de charge mentale. Ces conséquences peuvent être diminuées si la perte auditive ou la dépression du conjoint sont pris en charge et traités. L'âge, le sexe ou le degré de perte auditive ne semblent pas avoir d'effets sur les scores de perception du handicap auditif entre les sujets déficients auditifs et les proches.

a) Limites

Les données de la littérature évaluant l'impact de l'appareillage sur la qualité de vie des sujets ayant une perte auditive liée à l'âge et de leurs proches font état de plusieurs limites. Les échantillons sont souvent trop faibles ce qui limite la puissance statistique des résultats. De même, une grande majorité des études ne réalisent pas de tests subjectifs ou objectifs sur l'audition (audiométrie tonale, tympanométrie), nécessaires pour mieux comprendre l'impact de l'audition sur le quotidien des sujets et de leur entourage. L'étude canadienne prendra en compte ce facteur : tous les sujets recrutés, aussi bien les sujets âgés que leurs proches, devront passer un test d'audition en amont.

Par ailleurs, la prise en compte du ressenti simultané des proches ou des déficients auditives est rarement prise en compte. Or, avoir le point de vue des deux partis permet de mieux comprendre l'impact de la perte auditive dans sa globalité, les besoins de chaque individu, et de prendre en charge l'entourage dans son ensemble. Il est donc nécessaire d'ajouter des groupes contrôle afin d'évaluer de l'efficacité d'une intervention. De plus, un certain nombre d'études ont choisi de recruter aussi bien des sujets appareillés que non appareillés. Dans ces papiers, il est difficile de tirer des conclusions unanimes. En effet, le taux de sujets appareillés est souvent trop faible et un manque d'information sur l'appareillage (nombre d'appareils

portés, temps de port, gain prothétique) empêche de conclure à des résultats satisfaisant. Dans notre étude canadienne, des groupes distincts seront créés (sujets normoentendants, malentendants non appareillés et malentendants appareillés), afin d'évaluer véritablement l'impact de l'appareillage sur les sujets, et les comparer à un groupe contrôle. En outre, chez les sujets porteurs d'aides auditives, plusieurs paramètres seront relevés, comme le data-logging, le nombre d'années de temps de port des appareils ou encore le gain prothétique, qui peuvent grandement influencer les résultats. De plus, les proches de chaque parti seront interrogés afin d'observer les possibles différences et stratégies mises en place au quotidien avec leur partenaire.

Aussi, nombre d'études ont administré des questionnaires « fait maison », ou peu utilisés dans la littérature. Le niveau de preuve des données récoltées étant donc relativement faible, les résultats doivent alors être analysés de façon judicieuse, et en aucun cas être généralisés à la population globale. Pour l'étude canadienne, des questionnaires standardisés et validés par la littérature seront exclusivement utilisés, afin de limiter au maximum les risques de biais.

V. CONCLUSION

La perte auditive liée l'âge affecte plus de 250 millions de personnes dans le monde et sa prévalence augmente progressivement avec l'âge. Plusieurs études ont déjà pu montrer les conséquences néfastes de la perte d'audition sur le fonctionnement cognitif, social, communicatif et physique des sujets malentendants (Lin, 2012). L'impact de la perte auditive peut également avoir des effets collatéraux. Les membres de la famille, et en particulier les conjoints, assument souvent des responsabilités supplémentaires, et les rôles familiaux peuvent être modifiés. Cette revue systématique résume les études ayant évaluées l'impact de la perte auditive sur les sujets malentendants et leurs proches.

Il n'est plus à démontrer que la perte auditive affecte l'entourage des sujets malentendants. Certains facteurs externes peuvent aggraver ces sentiments, tels que le niveau de scolarité, le statut marital, ou encore les stratégies d'adaptations mises en place au sein du dyad. L'appareillage est apparait comme l'une des solutions permettant de diminuer la charge mentale, aussi bien des sujets déficients auditifs que de leurs proches.

Il est nécessaire que les prochaines études cliniques menées et les décisions en termes de politique de santé relatives à l'audition prennent en compte les répercussions de la perte auditive sur l'entourage. Cette revue systématique met en évidence les impacts généraux de la déficience auditive sur l'entourage et l'importance d'impliquer les proches aidants dans les décisions de traitement. La prise en compte de

l'entourage est primordiale pour la réussite d'un traitement auditif.

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Annexe 1

Étude (Auteur/année)	Pays	Type d'étude	Objectif	Échantillon	Critères d'inclusion	Groupe contrôle	Mesures/Questionnaires	Résultats	Limites
Bauer et al. (2017)	Brésil	Étude transversale descriptive	Analyser la prévalence des troubles auditifs chez les sujets âgés de l'Etat du Rio Grande au Brésil, et décrire le profil des participants ayant ou non des troubles auditifs en décrivant les facteurs épidémiologiques	n = 7167	âge ≥ 60 ans	Non	-Global Age-friendly Cities : a Guide -Question d'auto évaluation de l'audition -Données sociodémographiques	Facteurs protecteurs aux plaintes d'audition: un plus haut niveau de scolarisation, avoir reçu des soins de santé dans les 6 derniers mois, être marié ou séparé Facteurs de risques aux plaintes d'audition: un âge plus avancé, être un homme, difficultés à sortir de la maison et se retirer d'activités sociales, être célibataire ou veuf	Pas de tests objectifs sur l'audition, pas utilisation de Q standardisés, pas évaluation des proches

Boi et al. (2010)	Italie	Étude longitudinale	Effets de la réhabilitation auditive sur les symptômes dépressifs et la QV des sujets âgés malentendants.	n=15 sujets malentendants + 15 proches	sujets > 70 ans avec symptômes dépressifs non appareillés, consentant pour l'appareillage	Non	-Audiométrie tonale (500, 1k, 2k) et tympanométrie -CES-D (dépression) -CIRS (comorbidité) -ADL et IADL (dépendance fonctionnelle) -SF-36 (QV) -CBI (stress des proches) Appareillage des sujets à J0 avec test + retest) 1,3 et 6 mois	Chez les sujets déficients: Amélioration des scores des symptômes dépressifs après l'appareillage + amélioration de la QV. Bénéfice des aides auditives. Chez les proches: diminution du stress	Taille de l'échantillon, ajouter groupe contrôle ou groupe avec problèmes cognitifs
Brooks et al. (2001)	Angleterre	Étude longitudinale	Impact de la perte auditive sur les proches et les bénéfices qui découlent d'un appareillage.	n= 41 couples	Vivre avec un proche (conjoint ou autre), âgé entre 50 et 80 ans, PTA entre 35 et 65dB	Non	Questionnaire fait maison (conversation en tête à tête, situation de groupe, TV) + questions sur l'impact émotionnel Interviews à domicile du proche et du sujet malentendant dans 2 pièces séparées. Test à J0 et +6 mois après appareillage	Après l'appareillage : réduction des difficultés pour les proches et pour les sujets DA (amélioration de la communication, diminution du stress, TV moins dérangeante, diminution de la charge émotionnelle) . Importance du comportement du proche aidant dans l'efficacité de l'appareillage.	Q fait maison, pas assez de données pour la TV (qui choisit le niveau sonore, compromis) , manque d'infos sur le calcul de la perte auditive, le gain apporté des AA, le temps de port des AA après 6 mois
Carniel et al. (2017)	Brésil	Étude transversale	Evaluer par des questionnaires standardisés la qualité de vie des personnes âgées malentendantes utilisant ou non des appareils auditifs, ainsi que des sujets	n=90	-HLG : personnes âgées avec une perte auditive qui n'utilise pas AA. n=30 -HLHAG : personnes âgées avec une perte auditive qui utilise AA. n=30 -CG :	Oui	- Q sociodémographique -HHIE-S - WHOQOL_BREF	L'utilisation d'AA chez les sujets âgés malentendants améliore les résultats de leur propre QV, et améliore leurs conditions de vie et de santé, ce qui suggère que les AA ont un impact significatif et positif sur le processus de	Critères inclusion vagues (ME : quelles fréquences testées, symétrie audition ; NE : pas de test auditif, seule auto-évaluation) ; appareils auditifs (1 ou 2, temps de port/jour, année d'appareillage), critère

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			âgés sans perte auditive.		personnes âgées sans plaintes auditives. n=30			vieillessement en général.	âge inconnu, recrutement (différences sociodémographiques dans les groupes)
Chen et al. (2020)	Chine et USA (Texas)	Étude transversale	Évaluer l'état de santé des sujets âgés et étudier les facteurs associés à la qualité de vie liée à la santé des personnes âgées en Chine	n= 1278	Sujet âgés entre 80-99 ans et centenaires ≥ 100 ans)	Non	-EuroQol-5D (QV) - EQ-VAS (état de santé) -Données démographiques -Examen de santé (mesure du poids et de la taille (calcul IMC), présence ou non maladie chronique, hypertension, prise de sang	Une meilleure QV liée à la santé est significativement associée à un IMC élevé, absence de consommation d'alcool et de drogues, plus de loisir, vivre avec des membres de la famille, bon sommeil, bonnes relations sociales et familiales, pas de déficience auditive ou visuelle, peu de maladies chroniques	Peu d'études ont utilisé le Q EQ-5D (manque de normes); pas de tests des proches; majorité des sujets illettrés donc pas de résultats pour le niveau d'éducation, manque d'infos sur les revenus (beaucoup de données manquantes)
Chmiel et al. (1993)	USA (Texas)	Étude transversale	Comparer, dans un échantillon de population âgée, le handicap selon l'évaluation du sujet malentendant et selon l'évaluation du proche, et regarder dans quelle mesure cette comparaison est influencée par des facteurs auditifs et extra-auditifs.	n= 42 sujets + 42 proches	Pas d'infos	Non	-Test auditif (250, 500, 1k, 2k, 3k, 4k et 8k pour les 2 oreilles) + tympanométrie + réflexes stapédiens -HHIE (sujets malentendants) -HHIE-SO (pour les proches aidants) -DSI test (troubles cognitifs)	Les personnes âgées ont tendance à évaluer leur handicap auditif moins sévèrement que leurs proches. Nécessité de l'évaluation du handicap par des proches dans la compréhension des problèmes de communication avec le patient âgé.	Pas de tests auditifs des proches; les sujets de l'étude représentent surtout des pertes moyennes + sujets non appareillés - > intéressant de voir avec des pertes plus importantes et chez des sujets appareillés; DG des troubles cognitifs et auditifs centraux basés que sur le DSI (test dichotique) peut être inclure des tests objectifs ou

									des évaluations plus poussées de ces 2 aspects
Desbiers et al. (2001)	USA (Tennessee, Wisconsin, Washington-D.C.)	Étude de cohorte prospective	Évaluer le stress des proches des patients âgés et les facteurs associés	450 réponses complètes des proches	<u>Critères inclusion</u> : sujets de 80 ans et plus hospitalisés <u>Critères exclusion</u> : opération chirurgicale non urgente, porteurs du SIDA, autorisation de sortie dans les 48h après leur admission, traumatismes multiples.	Non	-Lecture des dossiers médicaux - Questions posées au sujet + au proche entre 3 et 4j après l'admission -Questions spécifiques posées aux proches	Chez les proches : augmentation du stress si le proche aidant est une femme, qui s'occupent 8h/j du conjoint, en mauvaise santé. Diminution du stress en traitant la PA ou la dépression	Pas de Q standardisés, pas d'évaluation d'autres causes de stress (antécédents psychiatriques, facteurs pouvant moduler le stress des aidants)
Kelly et al. (2011)	Nouvelle-Zélande et USA (Arkansas)	Étude transversale	Comparer la perception de la qualité de vie entre les couples de sexe différent et les couples de même sexe	n = 40 (10 couples de sexe différent et 10 couples du même sexe)	-1 membre du couple qui s'identifie comme étant malentendant mais n'a jamais consulté -En couple depuis au moins 2 ans - Âgés de 65 à 85 ans	Non	-Audiométrie tonale (0.5, 1 et 2 kHz), test dans le bruit -Données démographiques -HHIE -Entrevue structurée maison sur la QV	Conséquences de la PA aux niveaux émotionnel, social et de la communication. le sujet malentendant rapporte un score total et émotionnel plus élevé que le proche	Petit échantillon, participants avec un degré léger de perte auditive seulement
Kozakova et al. (2018)	République Tchèque	Étude transversale	Identifier les situations de handicap et les émotions perçues en lien avec la perte d'audition de la personne âgée,	n = 256 (128 malentendants et 128 proches)	Âgé > 65 ans, avec une perte auditive > 20 dB, avoir un contact direct avec le membre de la famille	Non	-Évaluation audiolinguistique -données démographiques -HHIE -HHIE-SP (pour les proches)	Pas d'effet de l'âge, du sexe ou de la perte auditive sur les scores au HHI entre sujets DA et proches Meilleure QV si la perte auditive est légère	Aucune information sur l'utilisation AA (seulement si port ou non)

			chez le malentendant et le membre de la famille						
Kramer et al. (2005)	Pays-Bas	Essairando misé	Évaluer l'efficacité d'un programme d'éducation comparé à l'utilisation d'aide auditive uniquement	Groupe contrôle (aide auditive seulement) : n=24 malentendants et 22 proches Groupe test (aide auditive et programme éducation) : n= 24 malentendants 24 proches	Aucun	Oui	Pour les couples du groupe expérimental : Q à réponses ouvertes (combien de temps avez-vous regardé chaque vidéos, qu'avez-vous appris etc...) Pour les sujets avec PA des groupes contrôle et expérimental : 8 questions posées avant et après l'intervention, et 6 mois après (échelle émotionnelle, stratégies de communication inspirée du HHDl) Pour les proches : évaluation de l'attitude des proches, inspirée du HHDl Évaluation de l'efficacité des AA (QV, impact sur les proches...) à l'aide du IOI, administré une fois après l'intervention et à + 6 mois : -IOI-HA : sujets avec PA du groupe contrôle -IOI-AI : sujets avec PA du groupe expérimental - IOI-HA-SO et IOI-AI-SO pour les proches	Amélioration de la qualité de vie et de la satisfaction dans le groupe de formation, pas pour le groupe contrôle. Certains effets différaient entre les nouveaux utilisateurs et les utilisateurs expérimentés d'aides auditives. L'ajout de formations et l'implication des proches sont pertinents dans la réhabilitation auditive.	Les sujets doivent avoir un système de lecteur DVD pour avoir accès aux vidéos, et être capable de s'en servir ; évaluer l'efficacité du programme avant l'appareillage ; effet plafond pour l'évaluation du programme chez les proches ; importance d'inclure des évaluations à long terme dans la recherche sur l'efficacité de traitements

Kuzuya et al. (2009)	Japon	Étude transversale	Effet de la déficience visuelle ou auditive sur la charge mentale des proches aidants	n= 1208 sujets âgés + 1208 proches	Pas d'infos	Non	<u>Pour les sujets âgés :</u> -données démographiques (activités de la vie quotidienne, maladie chroniques, chutes dans les 6 derniers mois, conditions de vie, pb de comportement) -auto-évaluation de l'audition ou des troubles visuels <u>Pour les proches :</u> -données démographiques (lien avec le sujet) -auto-évaluation de l'état de santé général -Q Zarit Burden Interview (ZBI)(charge mentale des proches)	La perte auditive des sujets âgés est associée à une charge mentale plus importante des proches aidants. l'amélioration de l'audition ou la correction de la déficience auditive puisse entraîner une réduction de la charge mentale du soignant. Les meilleurs prédicteurs au stress des proches sont : le sexe, l'âge, le nombre d'activités de la vie quotidienne, l'historique des chutes dans les 6 derniers mois, présence ou absence de démence, problèmes comportementaux associés à la démence, l'état de l'audition et l'état de santé du proche.	Pas d'évaluation objective de l'audition ou de la vision (audiométrie), pas d'infos précises pour les critères d'inclusion, prendre en compte d'autres facteurs socio-économiques (niveau de revenu/scolarité...)
Lazzarotto et al. (2016)	France	Étude transversale observationnelle	Regarder au sein d'un dyad si la QV du patient et du proche est influencée par les stratégies d'adaptation mis en œuvre par eux-mêmes ou par les proches.	n= 44 bénéficiaires et 44 proches	<u>Critères inclusion des bénéficiaires</u> : âge ≥ 55 ans ; PALA moyenne à sévère (≥21dB et < 70 dB HL), parlant et écrivant le français ; bénéficiaires d'une retraite	Non	-WHOQOL (QV) -Briefcope (stratégies d'adaptation) -Echelles visuelles analogiques (anxiété et humeur) -Lecture du dossier médical	La QV des personnes atteintes de PALA et de leurs aidants naturels est liée aux stratégies d'adaptation qu'elles utilisent. La QV des proches aidants est impactée : participer	Sujets volontaires pour l'étude, acceptant leur PA : faire avec des sujets ayant un déni de leur PALA ; petit échantillon : permet pas d'analyser en profondeur d'autres données comme

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					complémentaire pour cadre ou salariés du secteur privé <u>Critères d'inclusion pour les proches</u> : majeurs, désignés par le bénéficiaire comme étant le plus proche parent dans leur vie, parlant et écrivant le français			étroitement à la vie quotidienne d'une personne souffrant d'une déficience auditive liée à l'âge peut être difficile et gênant.	données sociodémographiques, le fait de porter un AA, le degré de perte auditive, le déclin cognitif.
Lazzarotto et al. (2019)	France	Étude transversale	Est-ce que la QV des patients et de leurs proches est influencée par des stratégies d'adaptation	n=448 patients + 448 proches	ME : âge $\geq$ 65 ans, PTA moyenne à sévère, bénéficiaires d'une pension complémentaire Proches : majeurs, désignés par le patient (conjoint, frère/sœur, autre)	Non	-Q d'auto-déclaration (âge, genre, niveau d'éducation, statut marital, statut professionnel, état de santé) -WHOQOL-Bref (QV) -Brief Cope (stratégies d'adaptation)	La QV des patients et de leurs proches aidants est directement influencée par les stratégies d'adaptation qu'ils utilisent (meilleure QV si utilisation de la résolution de problèmes et des pensées positives, moins bonne QV si utilisation des stratégies d'évitement ou de soutien social).	Données auto-rapportées, sujets volontaires (à faire chez des sujets n'acceptant pas leur PA), analyser d'autres facteurs influençant (utilisation d'AA)
Preminger et al., (2010)	USA (Kentucky)	Étude transversale	Déterminer les facteurs qui peuvent influencer la QV liée à la perte d'audition chez les sujets avec une perte auditive ainsi que chez leurs proches, et de	n= 52 sujets avec perte et 52 conjoints.	Le déficient doit obligatoirement avoir une perte auditive, appareillé (AA ou IC) ou non, pas de critères d'âge	Non	<u>Pour les proches + les sujets déficients auditifs</u> : -audiométrie tonale -PSS (stress) -ARS (humeur) -PCI (communication au sein du couple) -Q socio-démographique	Les caractéristiques psychosociales des individus affectent leurs perceptions de QV liée à l'audition. La perception de la QV liée à la perte auditive est hautement corrélée à	Critères d'inclusion assez vastes (sujets implantés cochléaires, appareillés ou non), pas de comparaison entre les sujets appareillés ou non, pas de critère d'âge (sujets de

			déterminer quels facteurs peuvent expliquer les différences de perception entre les partenaires.				e Pour les proches uniquement : HHI-S0 (QV liée à l'audition) Pour les sujets avec PA: -audiométrie vocale dans le bruit (QuickSIN) -HHIE pour les sujets ≥ 65 ans / -HHIA pour les sujets < 65 ans Q passés dans l'ordre suivant : Q sociodémographique, HHI, PSS, ARS, PCI. Lorsque le sujet PA passe les tests auditifs, le proche remplit les Q, et inversement, toujours dans le même ordre	l'humeur.	34 à 84 ans) même si la majorité ont au minimum 55 ans ; pas de critères au niveau de l'audition (surdités asymétriques acceptées, surdités profondes aussi); pas assez de sujets.
Scarinci et al., (2012)	Australie	Étude transversale :	Décrire les conséquences du handicap auditif sur une tierce personne (le conjoint) et évaluer les facteurs associés	n = 100 conjoints de personnes malentendantes	âgés ≥ 50 ans, audition normale (PTA ≤ 25 dB HL sur au moins une oreille), à la retraite, parler anglais, pas de problèmes auto-rapportés de mémoire ou de troubles neurologiques, être marié à une personne âgée d'au moins 50 et ayant une perte d'audition	Non	En amont : AT pour le couple, sur les deux oreilles Pour les conjoints : -Q démographique Répondre à la question suivante par oui ou non : - "Êtes-vous convaincu que votre partenaire fait tout ce qu'il peut pour l'aider à entendre -SOS-HEAR (impact de la PA) Pour les sujets déficients auditifs :	Conséquences de la PA : communication au sein du couple Facteurs liés au stress du proche aidant : la satisfaction du couple, écart d'âge, et perception du handicap auditif par le conjoint	Pas de prise en compte de la satisfaction du sujet DA au sein du couple (uniquement point de vue du conjoint) ; pas d'impact de l'appareillage mais peu de sujets appareillés : voir l'impact avant et après l'appareillage ; recruter plus de sujets et plus équitablement les conjoints (ici majoritairement des

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					(PTA > 25 dB HTL sur au moins une oreille).		SAC (impact de la PA sur leurs activités quotidiennes)		femmes) ; sujets volontaires donc pas forcément représentatif de la population
Scarinci et al., (2009)	Australie	Etude longitudinale	Développer et tester psychométriquement une échelle (SOS-HEAR) permettant de mesurer le handicap de conjoints de personnes âgées souffrant de déficience auditive.	n=100 conjoints	Une personne du couple a une perte auditive (PTA > 25 dB HL sur la meilleure oreille) et le conjoint est NE (PTA ≤ 25 dB HL), aucun problèmes cognitifs ou neurologiques, âge ≥ 50 ans.	Non	-audiométrie tonale (500, 1k, 2k, 4k) pour le couple sur les deux oreilles -données démographiques -SOS-HEAR : test-retest avec un intervalle de 2 semaines	Le SOS-HEAR est un instrument bref, facile à administrer, dont la fiabilité et la validité sont avérées. Le SOS-HEAR pourrait servir à identifier les conjoints de personnes âgées malentendantes ayant besoin d'une intervention, dirigée soit vers le couple, soit vers le conjoint seul.	Re-test sur 27% des participants recrutés et non sur la totalité de la population ; pas de distinction dans les résultats entre les conjoints appareillés ou non ; les besoins du conjoints dans la réadaptation ne sont pas identifiés ; évaluer sur un échantillon plus grand ; participants volontaires jugeant eux-mêmes de l'impact négatif de l'audition sur leur vie : faire passer le test en clinique pour plus de validité
Schulz et al., (2016)	USA (Caroline du Nord, Californie, Oregon)	Etude transversale	Evaluer les facteurs qui influencent les sujets dont on soupçonne de souffrir de perte auditive à poursuivre les évaluations clinique, et regarder ce que représentent	n=413	Etre âgé entre 55 et 75 ans, avoir consulté pour un soucis ORL (nez, oreille, gorge), dont un proche se plaint de l'audition du sujet au cours de l'année écoulée	Non	-Une question obligatoire (avez-vous effectué une évaluation clinique suite à votre perte auditive présumée ?) -Q démographique -HHIE-S -HBQ -SOS-HEAR (pour les proches)	Le modèle HBM est un bon prédicteur dans la poursuite des évaluations cliniques chez les sujets se plaignant de leur audition. La charge mentale des proches a un impact sur la poursuite des évaluations, et améliore l'ajustement	Auto-évaluation de l'audition ; étude transversale et non longitudinale ; Q HBQ peu utilisé même s'il a été validé

			e la charge mentale de la perte auditive chez les proches, en utilisant le modèle HBM.					du modèle.	
Stark et al., (2004)	Australie	Etude longitudinale	L'effet de la perte auditive et de la réhabilitation auditive sur le sujet déficient et son proche.	n= 93 sujets malentendants et 78 proches	Sujets déficients : Etre éligible aux port d'AA, ne jamais avoir porté d'AA, parler et lire l'anglais Pour les proches : savoir parler et lire l'anglais	Non	<u>Sujets déficients :</u> -audiométrie tonale pour les sujets déficients + gain d'insertion + niveaux de confort et d'inconfort -audiométrie vocale (phonèmes, CVC) -HHIE -SF-36 <u>Pour les proches :</u> - QDS (impact de l'audition sur le proche, version modifiée) -SF36 -données démographiques (relation avec le sujet déficient) Adaptation des AA 2 semaines après le 1^{er} rdv. Q à J0 + 3 mois après l'adaptation des AA pour les proches et les sujets avec PA (+ relevé du temps de port des AA)	Impact de la déficience auditive chez le sujet mais aussi sur le proche. Diminution de cet impact pour les deux partis grâce aux aides auditives.	Pas de critère d'âge ; pas d'évaluation de validité du QDS ; les sujets répondaient seuls aux Q, pas d'évaluateurs pour les aider ; pas de groupe contrôle (sujets sans AA) ; prendre en compte les autres facteurs pouvant influencer la QV ; SF36 pas assez appropriée pour étudier les sujets âgés malentendants et leurs proches

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Renal Denervation for the Treatment of Hypertension

By Renata Melo de Carvalhoo Lima, Luciane alves de Oliveira, Marilia Albuquerque Barreto, Matheus Henrick Pereira de Almeida, Maria Jullia Alvares de Melo, Bruno Renan de Carvalho Lopes, Nahara Hajar Costa, Letícia Verônica Rizzato Graciano, Tábata de Oliveira Silva, Augusto Henrique de Brito Peres, Vinicius Rahal Basseto, Maria Eugênia Pissinati Gomes, Fernanda Kelly Araújo Lima, Giovanna de Carvalho Vilas Boas, Ana Carolina Lustosa Araújo Souza, Beatriz Regis da Cunha, Lina Borges Cavalcante, Dra. Aline de Amorim Duarte, Eduardo Fernandes Rodrigues & Raphael Vinicius Mendes Abreu

Abstract- This literature review focuses on the analysis of renal denervation therapy as a potential treatment for difficult-to-control hypertension. Systemic arterial hypertension (SAH) is a prevalent condition with various approaches to achieving control, including lifestyle modifications, pharmacological interventions, and surgical treatments. The fluctuations in blood pressure within the kidneys occur due to the stimulation or inhibition of sensory and motor pathways in the renal nerves. Each of these modifications is linked to the underlying condition in the progression of hypertension. The employed methodology involves the ablation of renal afferent and efferent nerves using a catheter through percutaneous intervention facilitated by ultrasound.

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Renal Denervation for the Treatment of Hypertension

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Abstract- This literature review focuses on the analysis of renal denervation therapy as a potential treatment for difficult-to-control hypertension. Systemic arterial hypertension (SAH) is a prevalent condition with various approaches to achieving control, including lifestyle modifications, pharmacological interventions, and surgical treatments. The fluctuations in blood pressure within the kidneys occur due to the stimulation or inhibition of sensory and motor pathways in the renal nerves. Each of these modifications is linked to the underlying condition in the progression of hypertension. The employed methodology involves the ablation of renal afferent and efferent nerves using a catheter through percutaneous intervention facilitated by ultrasound.

I. INTRODUCTION

Systemic arterial hypertension (SAH) is a prevalent medical condition. Despite extensive research and the availability of effective and safe pharmacological treatments, a significant number of patients face challenges in achieving optimal control of their blood pressure levels, leading to a classification of treatment resistance. The regulation of blood pressure is primarily governed by the sympathetic nerves, which maintain a constant level of activity and establish the sympathetic tone in the heart, blood vessels, and kidneys [1, 2].

Renal denervation therapy has been shown to effectively lower blood pressure in patients with resistant hypertension. This therapy works by deactivating specific regions between the central nervous system and the kidneys, resulting in an immediate decrease in renal sympathetic nerve activity and a subsequent reduction in blood pressure levels. This modality is considered invasive and has demonstrated a high level of safety, low complexity, and a favorable prognosis rate. As a result, it can help reduce the need for excessive medication dosages [1, 6].

II. METHODOLOGY

This is a literature review whose sources were taken from the SciELO and PubMed data platforms. The search period was July 2023, meeting the inclusion

criteria of articles from 2000 to 2023, in Portuguese and English, online, and in full text. The following health descriptors (DeCS) were used as strategies to better evaluate the texts: "Denervation", "Systemic Arterial Hypertension" and "Treatment".

III. DISCUSSION

Systemic arterial hypertension (SAH), which currently affects 1.2 billion people globally, results in medical expenses, cardiovascular disease mortality, and crippling patient consequences. The sympathetic nerves, which are active in vascular tone and work on the heart, arteries, and kidneys, physiologically regulate blood pressure. The sympathetic and parasympathetic nervous systems supply the kidney with blood flow. Although sympathetic innervation is connected to renal physiology, excessive activity can cause hypertension [1, 4].

Numerous studies have been successful in illuminating hypertension, and effective treatment options for SAH have been discovered. The main antihypertensive medications are diuretics, angiotensin-converting enzyme inhibitors, angiotensin receptor blockers, antiadrenergic medications, calcium channel blockers, and renin inhibitors, and they are all effective. These medications can be used on their own or in combination with three other medications, although some patients still experience unsatisfactory BP levels despite the combinations, necessitating the adoption of other therapeutic approaches like renal denervation. [2]

The peripheral sympathetic neural system is defined by regions, meaning that altering sympathetic activity can produce different effects in certain regions. The renal neural pathways contain efferent and afferent nerve fibers. These nerves are arranged alongside the wall of the renal arteries, but not symmetrically. A recent study in humans showed that 1) the right renal artery is significantly more innervated than the left; 2) the anterior and superior quadrants are more innervated than the posterior and inferior quadrants; and 3) the distal third of the renal arteries is more innervated than its proximal

segments. The efferent fibers function through nerve impulses from the central nervous system towards the kidneys, influencing renal function; the main neurotransmitter is noradrenaline, while the afferent fibers carry information from the kidneys to the CNS. These fibers respond to chemical, mechanical, nociceptive, and chemical stimuli [3, 4].

The fluctuation of blood pressure in the kidney is associated with the activation and inhibition of the afferent and efferent pathways of the renal nerves. Each of these changes is linked to the underlying pathology that leads to the development of hypertension.

Hypertension is associated with increased sympathetic activity resulting from afferent signals originating from the kidneys. This leads to the redefinition of sympathetic tone through adenosine triphosphate (ATP) receptors, which can cause vessel hypertrophy in response to angiotensin II. Research conducted on animals has demonstrated that an overactive sympathetic system plays a crucial role in the development of hypertension. As a result, denervation has emerged as a potential alternative treatment for hypertension [2].

Sympathetic denervation of the kidneys is characterized by the ablation of renal afferent and efferent nerves. This procedure can be done through a catheter with a percutaneous intervention using ultrasound that comes from a piezoelectric crystal at the end of the catheter and is focused on the renal artery by inflating a water-cooled balloon or even radiofrequency, which suspends the nerve fibers in the adventitia of the renal artery. [3,5]

A randomized study comparing the two denervation methods (RADIOSOUND-HTN) concluded that ultrasound ablation can create deeper lesions in the main renal arteries. Other risks of the procedure as a whole include hemorrhage, arterial stenosis, and aneurysm, as well as side-effects of the procedure due to the sympathetic nerve acting on other functions; however, the recording of these events was not significant enough to compromise the safety and benefits of the procedure. [2,4,5]

Even though the results of animal studies were encouraging, many patients continue to take antihypertensive medications to manage their blood pressure even after denervation. Some clinical trials were still ambiguous, while others revealed a beneficial outcome in BP measurement following the treatment in the office. The current research aims to examine the efficacy of non-pharmacological interventions in managing hypertension, with the objective of determining if these interventions yield satisfactory outcomes [6].

IV. CONCLUSION

Considering the significant prevalence of systemic arterial hypertension within the population, it is of paramount significance to develop innovative or alternative pharmacological strategies for effectively managing blood pressure. Renal denervation has demonstrated efficacy as a viable alternative procedure for patients with resistant hypertension, as evidenced by the immediate improvement in blood pressure observed in patients undergoing this intervention. Therefore, it is crucial to prioritize the promotion of new research and studies on the subject to strengthen this therapeutic measure and evaluate its application in clinical practice [2, 6].

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Acute Effects of Spontaneous Slow Breathing and Prohibition of Media Device use on Cardiac Autonomic Function and Blood Pressure during Sleep in Young Men

By Ryota Kobayashi & Hideyuki Negoro

Abstract- Blood pressure (BP) during sleep is a risk factor for cardiovascular disease. Poor sleep quality leads to hypertension. Sleep quality decreases with media device use and increases with deep breathing. Our objective was to examine the acute effects of slow breathing and refraining from using media devices on cardiac autonomic function and blood pressure during sleep. Fifteen healthy male participants were randomly assigned to one of three conditions: (a) slow breathing (BT) condition (12 consecutive breaths of 4 s of inhalation through the nose, 4 s pause, and 8 s of exhalation, approximately 3 min per breath), (b) a BT condition (BT+Non-LED) in which slow breathing was performed and the use of light-emitting devices (LED; smartphones, tablets, computers, etc.) was prohibited 1 hr before bedtime, and (c) a control condition (CON) in which slow breathing was not performed, and the use of LED was permitted. Blood pressure was measured by oscillometric method at baseline and 2 and 4 o'clock at bedtime. Autonomic function was measured by heart rate variability for 24 hours.

Keywords: sleep; blood pressure; heart rate variability; low frequency; high frequency.

GJMR-F Classification: NLM: WG100



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Acute Effects of Spontaneous Slow Breathing and Prohibition of Media Device use on Cardiac Autonomic Function and Blood Pressure during Sleep in Young Men

Ryota Kobayashi^α & Hideyuki Negoro^ο

Abstract- Blood pressure (BP) during sleep is a risk factor for cardiovascular disease. Poor sleep quality leads to hypertension. Sleep quality decreases with media device use and increases with deep breathing. Our objective was to examine the acute effects of slow breathing and refraining from using media devices on cardiac autonomic function and blood pressure during sleep. Fifteen healthy male participants were randomly assigned to one of three conditions: (a) slow breathing (BT) condition (12 consecutive breaths of 4 s of inhalation through the nose, 4 s pause, and 8 s of exhalation, approximately 3 min per breath), (b) a BT condition (BT+Non-LED) in which slow breathing was performed and the use of light-emitting devices (LED; smartphones, tablets, computers, etc.) was prohibited 1 hr before bedtime, and (c) a control condition (CON) in which slow breathing was not performed, and the use of LED was permitted. Blood pressure was measured by oscillometric method at baseline and 2 and 4 o'clock at bedtime. Autonomic function was measured by heart rate variability for 24 hours. Hi, frequency (HF) during sleep was higher in BT and BT+Non-LED trials than in CON trials ($P<0.05$). Low frequency (LF), LF/HF, and systolic BP during sleep were lower in BT and BT+Non-LED trials than in CON trials ($P<0.05$). These results suggest that slow breathing techniques and prohibiting the use of LEDs before bedtime may improving sleep quality and nocturnal BP in healthy young adults.

Keywords: sleep; blood pressure; heart rate variability; low frequency; high frequency.

1. INTRODUCTION

Nearly one-third of the general population experiences symptoms of insomnia (defined as difficulty in falling asleep and, or staying asleep), with 4-26% experiencing excessive sleepiness and 20% experiencing excessive sleepiness [1]. Overwork and lack of sleep are major social problems, especially in Japan [2]. Use of electronic devices such as smartphones and tablets may interfere with a good night's sleep [3]. According to a survey by the Ministry of Internal Affairs and Communications of Japan, the smartphone ownership rate among young individuals is

over 90% [4]. The use of cell phones and tablets before bedtime in individuals in their teens and 20s has increased by 20% in all countries [5]. Sleep is deeply related to autonomic nervous activity, with parasympathetic activity predominant during non-rapid eye movement (REM) and sympathetic activity during REM sleep [6]. Heart rate variability (HRV) is a non-invasive measure of autonomic activity [7]. For example, to sleep depth and HRV, low frequency (LF)/ high frequency (HF) components increase during REM sleep and decrease during non-REM-REM sleep [8]. Confirmation by simultaneous recording of sleep electroencephalography (EEG) and HRV has been demonstrated [9]. Exposure to a 6700K light before sleep suppresses increased HF components [10]. In other words, exposure to blue light from smartphones and other sources before bedtime may decrease parasympathetic nervous system activity. Therefore, refraining from using smartphones and other media devices before bedtime may activate the parasympathetic nervous system during sleep.

Voluntary control of breathing, significantly a decrease in rate, originated in Eastern traditions and has been used for thousands of years as an essential part of meditation and relaxation [11, 12]. Slower than spontaneous breathing can activate the parasympathetic nervous system [13, 14], and lower blood pressure upon awakening [15]. According to Kario et al. [16], a ten mmHg increase in home systolic blood pressure (SBP) at night is associated with a 20% increased risk of cardiovascular disease, independent of the day office and morning home blood pressures. Orjasalo et al. [17] reported that individuals with reduced parasympathetic function during sleep have a higher SBP during sleep. In other words, nocturnal home systolic blood pressure and parasympathetic activity could be related. Therefore, refraining from using media devices before bedtime and slow breathing may improve cardiac autonomic activity during sleep and home blood pressure at night.

Our objective was to examine the acute effects of slow breathing and refraining from using media devices on cardiac autonomic function and blood

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pressure during sleep. We hypothesize that deep breathing during the day and non-use of media devices before bedtime will activate the parasympathetic nervous system, as indexed by HRV during sleep, and lower blood pressure.

II. MATERIALS AND METHODS

a) Participants

Because HRV changes differ between men and women owing to hormonal differences [18], only men were recruited for this pilot study to minimize variability. Fifteen healthy male participants aged 19-20 who provided informed consent were recruited from Teikyo University of Science-related student programs. Before the start of the study, all participants provided written informed permission after receiving a complete verbal and written explanation of the purpose and methods of the analysis. Eligible participants were young male with no medical history and good health. Those with a history of abnormal blood/urine test results or hypertension or abnormal chest radiograph or electrocardiogram findings and those taking medications that may alter blood pressure were excluded. The study was conducted by the Declaration of Helsinki and was reviewed and approved by the Ethics Committee of Teikyo University of Science (approval number: 22A009). Participants were instructed to go to bed at 0:00 and wake up at 07:00 for seven days before the test session; this schedule was maintained throughout the test. This reduced the impact of sleep duration on this study outcome. Each participant was randomly assigned to one of three conditions: (a) a slow breathing (BT) condition (12 consecutive breaths of 4 s of inhalation through the nose, 4 s pause, and 8 s of exhalation, approximately 3 min per breath), (b) a BT condition (BT+Non-LED) in which slow breathing was performed, and the use of light-emitting devices (LED; smartphones, tablets, computers, etc.) was prohibited 1 hr before bedtime, and (c) a control condition (CON) in which slow breathing was not performed and the use of LED was permitted. Participants randomly determined the order in which the three conditions were performed using the online Research Randomizer tool (www.randomizer.com) before the test session.

b) Study design and slow breathing

All tests were performed in a quiet room from 09:00 to 09:00 the next day. After written informed consent was obtained, the wearable heart rate sensor WHS-1 (Union Tool Corporation, Tokyo, Japan) was placed at the center of the participant's chest. The RR interval is the heart rate interval measured between the peaks of successive QRS waveforms on the ECG. It was measured using the wearable heart rate sensor WHS-1 (UNION TOOL CO. Tokyo, Japan) and analyzed offline. Participants were instructed to rest in a seated position for 5 min while reading the study instructions, after

which body composition (height, weight, body fat percentage, and body mass index [BMI]) and baseline heart rate and blood pressure were recorded. The researcher explained and demonstrated slow abdominal breathing to the participants so that they could fully understand it. Participants performed slow abdominal breathing with eyes closed and relaxed. The breathing control procedure was as follows. (1) Exhale entirely through the mouth. (2) While placing your hand on your belly, count 4 seconds in your mind, then breathe through your nose to expand your belly. (3) Count mentally for 4 seconds and hold your breath. (4) Count mentally for 8 seconds, exhale, and let the belly contract. Participants were asked to repeat for three minutes. In BT and BT+Non-LED conditions, abdominal breathing was performed every hour from 09:00 to 17:00 and at 23:00 (1hr before bedtime). In the BT+Non-LED condition, media devices were prohibited from 23:00 (1hr before bedtime); at 23:45 (before bedtime), a wrist blood pressure monitor (HEM-9601T, Omron Healthcare Corporation) was placed on the participant's left wrist for sleep preparation. The participant was instructed to sleep at 00:00; blood pressure and heart rate were automatically recorded at 02:00 and 04:00. Participants were awakened at 07:00 and had breakfast (typical Japanese rice, miso soup, and grilled fish) at 08:00. All measurements in the participants were completed at 09:00.

c) Measurements

i. Body composition

Body height was measured in 0.1 cm increments using a height meter (Sanwa Corporation, Tokyo, Japan), and body weight and fat percentage were measured noninvasively (impedance method) using a body composition analyzer (InnerScan Dual Black RD-E04BK, Tanita Corporation, Tokyo, Japan). BMI was calculated by dividing weight (kg) by height squared (m^2) (kg/m^2).

ii. HRV analysis

HF and LF HRV components reflect parasympathetic and sympathetic activation [19]. The LF/HF ratio is generally assessed to measure the overall sympathetic vagal balance and degree of autonomic excitation [19]. RR intervals recorded using the wearable heart rate sensor WHS-1/RRD-1 (Union Tool Corporation, Tokyo, Japan) were downloaded and analyzed using the HRV analysis software RRI Analyzer 2 (Union Tool Corporation, Tokyo, Japan). The software converted the RR interval into the frequency domain indices LF (ms^2), HF (ms^2), and LF/HF ratio. Each index was calculated at 2-min intervals based on standard recommendations; 1 min is needed to assess the HF component of HRV, whereas approximately 2 min is required in order to address the LF component [20]. Before analysis, automatic artifact correction and HRV spectral analysis were performed on all recordings.

According to standard recommendations, the LF and HF bands were defined at 0.04-0.15 Hz and 0.15-0.4 Hz, respectively [21].

iii. Blood pressure

SBP and diastolic blood pressure (DBP) were measured automatically using the oscillometric method with a wrist sphygmomanometer (HEM-9601T, Omron Healthcare Corporation) worn on the left wrist at 09:00 (baseline) and 02:00 and 04:00 (while sleeping). The coefficient was 2%, and the inter-rater coefficient of variation was 3%.

iv. Statistical analysis

Fifteen participants were included in the complete analysis for this study. Clinical response rates and 95% confidence intervals were calculated, and blind statistical analyses were performed. Data for the outcome variables were tested for normality and log

normality using the Shapiro-Wilk test. Repeated measures two-way analysis of variance was used to evaluate the between-trial changes in each step of each intervention using a post hoc test (Bonferroni method). All statistical analyses were performed using IBM SPSS Statistics (ver. 25; IBM Corp., NY, USA), with a statistical significance level of 5%. All data were presented as mean $\pm$ standard deviation.

III. RESULTS

a) Physical characteristics

All enrolled participants ($n = 15$) completed the study sessions without any adverse events. Participants' height, weight, body fat percentage, BMI, resting blood pressure, heart rate, and spontaneous respiratory rate are summarized in Table 1.

Table 1: Participant characteristics ($n=15$)

Variable	Value
Age, years	20 $\pm$ 2
Height, cm	170 $\pm$ 5
Weight, kg	57 $\pm$ 4
Body fat, %	16 $\pm$ 2
BMI, kg/m ²	19 $\pm$ 2

Values are mean $\pm$ SD; BMI, body mass index.

b) Parasympathetic response (HF)

HF is shown in Figures 1a, and 1b. HF for all trials was higher during sleeping than at 23:00 (awake) ($P < 0.05$, Figure 1a). HF during sleep was more increased in BT and BT+Non-LED trials than in CON trials ($P < 0.05$, Figure 1b).

c) Sympathetic response (LF)

LF/HF is shown in Figures 1c and 1d. LF/HF for all trials was lower during sleep than before bedtime ($P < 0.05$, Figure 1c). LF/HF during sleep was higher in BT and BT+Non-LED trials than in CON trials ($P < 0.05$, Figure 1d).

d) Sympathetic vagal response (LF/HF)

LF/HF is shown in Figures 1e and 1f. LF/HF for all trials was lower during sleep than before bedtime ($P < 0.05$, Figure 1e). LF/HF during sleep was higher in BT and BT+Non-LED trials than in CON trials ($P < 0.05$, Figure 1f).

e) Blood Pressure

SBP and DBP are shown in Figure 2. SBP and DBP for all trials were lower at 02:00 and 04:00 (sleeping) than at baseline ($P < 0.05$, Figure 2a and 2b); SBP and DBP at 02:00 and 04:00 were lower for the BT+Non-LED trial than for the CON trial ($P < 0.05$, Figure 2a and 2b).

IV. DISCUSSION

Results of this intervention in young men showed that HF during sleep was higher in the BT and BT+Non-LED trials than in the CON trial, and LF and LF/HF during sleep were lower in the BT and BT+Non-LED trials than in the CON trial. Sleeping SBP and DBP were also lower in the BT+Non-LED practice than in the CON trial. Thus, daily abdominal breathing improved parasympathetic and sympathetic activity during sleep. Furthermore, this is the first study to show that the combination of daily abdominal breathing and the prohibition of using LED before bedtime reduced blood pressure during sleep.

Autonomic nervous system controls heart rate [1]. Changes in activities of the parasympathetic and sympathetic nervous system change each heartbeat, and this HRV can reflect the movement of the autonomic nervous system [22]. This study was conducted on young men to avoid the effects of sex on HRV. Breathing involves sympathetic activity during the inspiratory phase and parasympathetic activity during the expiratory phase [23]. Other slow, deep breathing, such as that used in yoga and meditation, regulates autonomic nervous system function [24]. Slow, deep breathing may accommodate higher cardiopulmonary synchrony and promote the parasympathetic tone [25].

In contrast, irregular and rapid breathing can cause sympathetic excitation [26]. Slow-paced breathing interventions improve sleep quality [27]. According to Oneda et al. [28], slow deep breathing caused cardiopulmonary synchronization and a more potent inhibition of sympathetic activity. Diaphragmatic breathing increases parasympathetic activity at night and improves sleep quality [29]. Past studies have significantly increased HFpower and reduced state anxiety in young people [30]. Similar to previous studies, this study showed that slow, deep breathing increased parasympathetic activity and decreased sympathetic activity during sleep. Thus, slow, deep breathing could be used to improve sleep quality. However, whether the results of this study are, the effect of daily diaphragmatic breathing or one before bedtime cannot be determined. In other words, the impact of pre-bedtime and daily diaphragmatic breathing on autonomic activity during rest must be compared.

Diaphragmatic breathing can affect blood pressure variability. Recently, Lee et al. [31] found that slow, deep breathing caused a circadian effect improvement in blood pressure and heart rate in young adults. Many studies have shown that deep breathing lowered SBP by 4–54 mmHg in individuals of various ages with various blood pressure levels [32]. In this study, a decrease in SBP and DBP was observed at bedtime at night after a full day of practicing slow deep breathing, indicating suppression of sympathetic activity. According to Kario et al. [16], a ten mmHg increase in SBP while sleeping is associated with a 20% increased risk of cardiovascular disease, independent of office or early morning blood pressure. In other words, reducing nocturnal blood pressure is necessary to reduce future cardiovascular disease mortality. Therefore, the implementation of abdominal breathing, as evident through the results of this study, could lower blood pressure during sleep and reduce the risk of future cardiovascular disease mortality.

The use of smartphones, tablets, and other LEDs has increased significantly over the past decade [33]. LEDs have become so indispensable that they are now portable and easily transportable, and may have become such a routine that they can be used while lying down at bedtime. This is because light is the most powerful environmental signal affecting the human circadian clock and may play a role in perpetuating sleep deprivation [34]. Other studies have assessed the use of technology devices in the hour before bedtime (e.g., TV most popular; 60%), but those aged under 30 years are more likely to use cell phones than those aged over 30 years (36% of middle-aged and 16% of older adults) [35]. In healthy young adults, the use of blue light-emitting smart devices before bedtime has been shown to reduce sleep quality [36]. To our knowledge, no studies have reported the autonomic effects of smartphone or tablet use. Prior studies have examined

autonomic responses to blue light emission in healthy young individuals and found no clear evidence to support changes in the autonomic effects of blue light emission [37]. The study found no difference in the results of breathing alone or diaphragmatic breathing and the prohibition of using media devices before bedtime on the activity of the autonomic nervous system during sleep. A study in healthy men reported that the adding bright light (~10,000 lux) to the room led to a decrease in the amplitude of the melatonin rhythm [38]. Chang et al. reported that reading an e-book on an LED rather than a printed book before bedtime suppressed melatonin release and perpetuated sleep deprivation in healthy young adults [39]. Scheer et al. reported that taking melatonin 1 hour before bedtime significantly lowered blood pressure during sleep [40]. In this study, blood pressure during sleep was lower in the BT+Non-LED trial compared to the CON trial. In other words, the improvement in the autonomic nervous system during bedtime due to slow breathing and the activity of melatonin secretion due to the prohibition of LEDs before rest may have reduced blood pressure during sleep. However, improvement in HRV was observed after four weeks of breathing training [41]. Breathing training lowers blood pressure [42]. Importantly, these reductions are similar to those seen in response to other non-pharmacological lifestyle interventions (e.g., Dietary Approaches to Stop Hypertension diet, sodium restriction, caloric restriction, aerobic exercise, and meditation) [43]. In other words, since autonomic nervous system activity is related to blood pressure, slow, prolonged breathing may effectively lower blood pressure during sleep. Therefore, we need to examine the long-term effects of slow breathing on autonomic nervous system activity, melatonin, and blood pressure during sleep.

There were several limitations to this study. First, because the participants were healthy young men, caution should be exercised in generalizing the results to older adults and those with impaired sleep quality, such as those with metabolic syndrome. Second, this study did not assess melatonin activity or perform EEG, the results of which may have significant effects on arterial stiffness. Third, this is a study of acute effects and not a long-term study. Breathing techniques and prohibiting the use of luminous devices may contribute to better sleep quality but require more long-term studies. The small sample size warrants caution in interpreting the results and limits the generalizability of the present findings.

V. CONCLUSION

In this study, HF during sleep was significantly higher, and LF was lower in the BT and BT+Non-LED trials than in the CON trial. Furthermore, blood pressure during sleep was significantly lower in BT+Non-LED

problems than in CON trials. These results suggest that slow breathing techniques and prohibiting the use of LEDs before bedtime may be effective in improving sleep quality and nocturnal blood pressure in healthy young adults.

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Authors' Contributions

RK and HN designed the research; RK and HN conducted the research; RK and HN analyzed data; and RK wrote the paper. RK had the primary responsibility for the final content. All authors read and approved the final manuscript.

Availability of Data and Material

Data described in the manuscript, code book, and analytic code will be made available upon request pending [e.g., application and approval, payment, other].

Code availability

Not applicable.

Compliance with Ethical Standards

Disclosure of potential conflicts of interest: The authors declare that they have no conflict of interest.

Research involving human participants and/or animals: This study was conducted in accordance with the Declaration of Helsinki and approved by the Ethics Committee of Teikyo University of Science (approval No.: 22A009). This study has been clinically registered with the University Hospital Medical Information Network Center (study No.: UMIN000050435).

Informed consent: Before the study began, all participants received a complete explanation of the study's purpose and methods before providing their written informed consent.

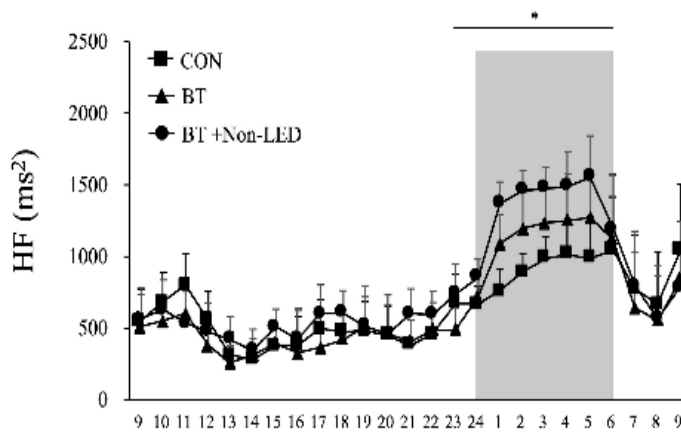
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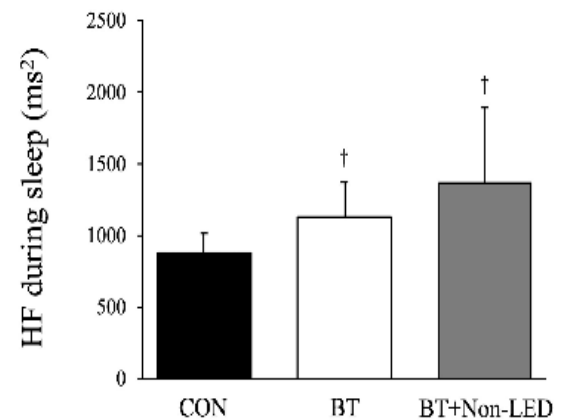
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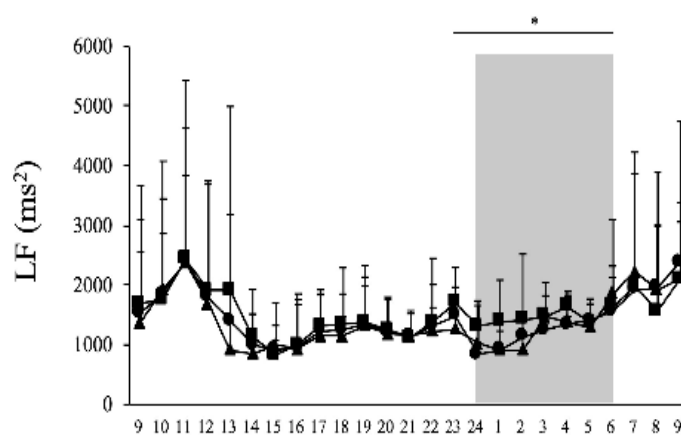
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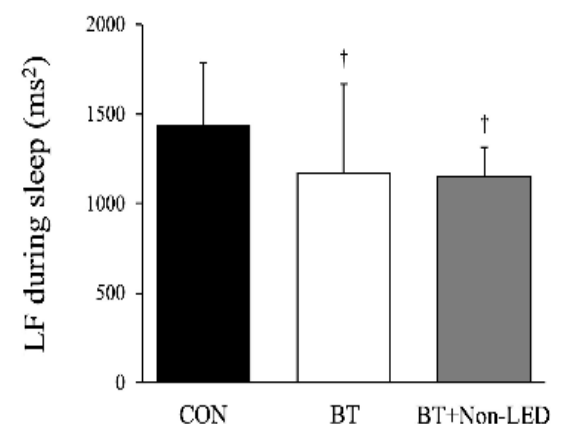
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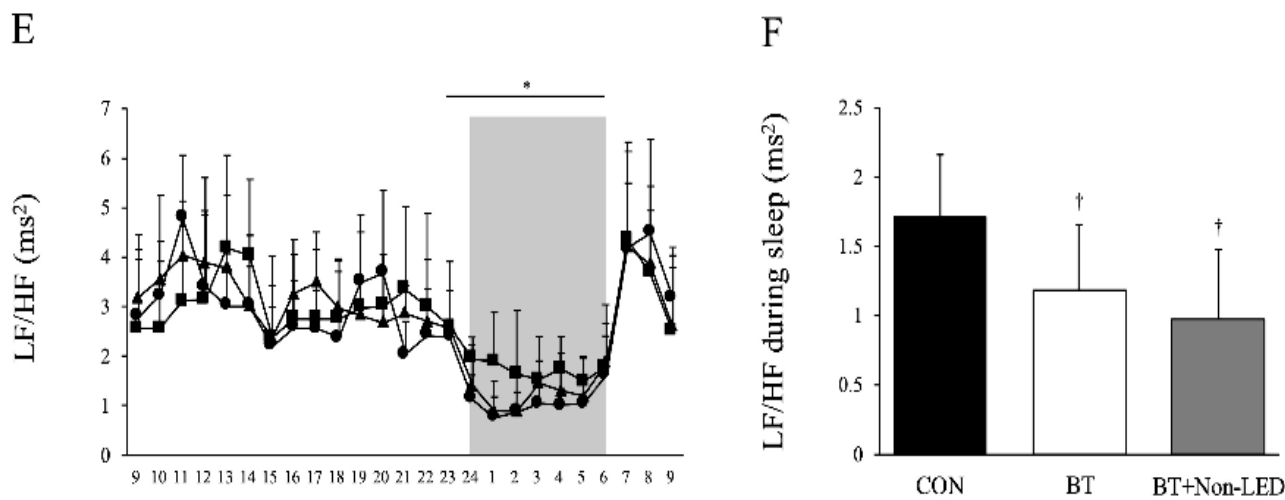
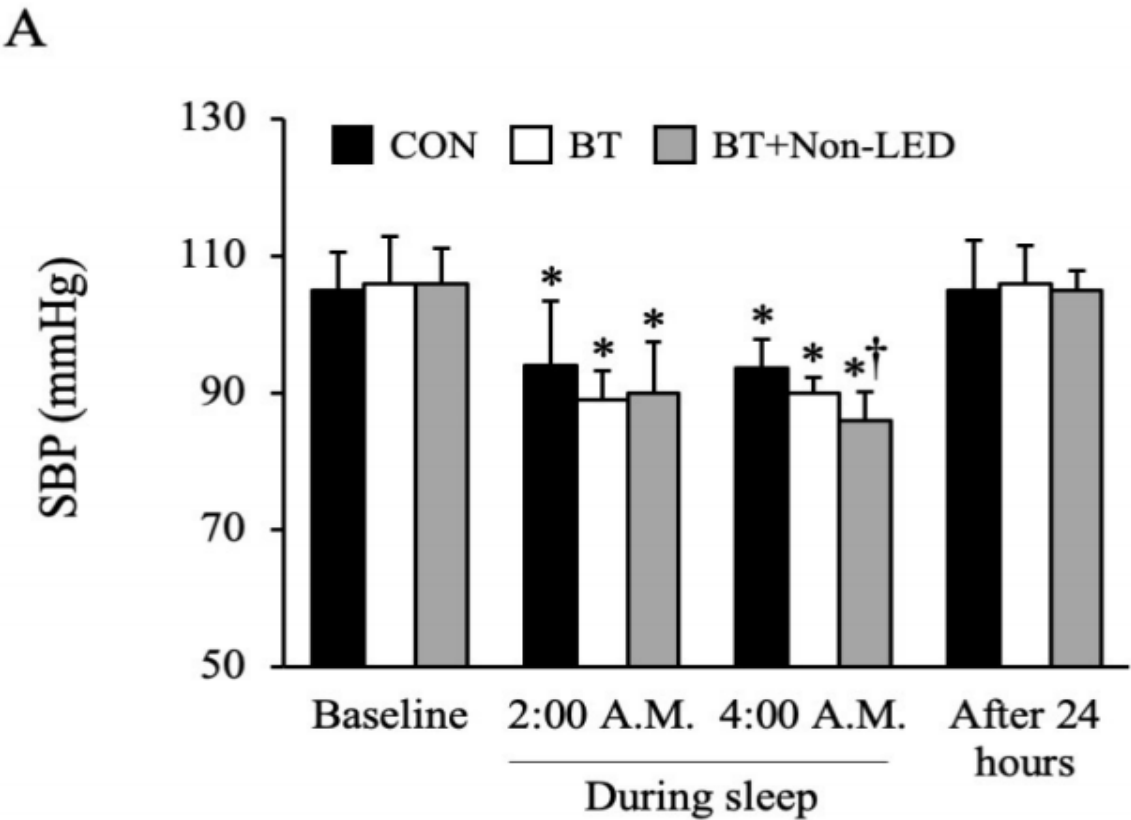


Fig. 1: Changes in heart rate variability

Values are expressed as mean $\pm$ standard deviation. Gray color in Figures A, C, and E indicates values during sleep. HF, high frequency; LF, low frequency; BT+Non-LED, breathing techniques+Non-Light Emitting Devices. * $P < 0.05$ vs. 23:00. † $P < 0.05$ vs. CON



B

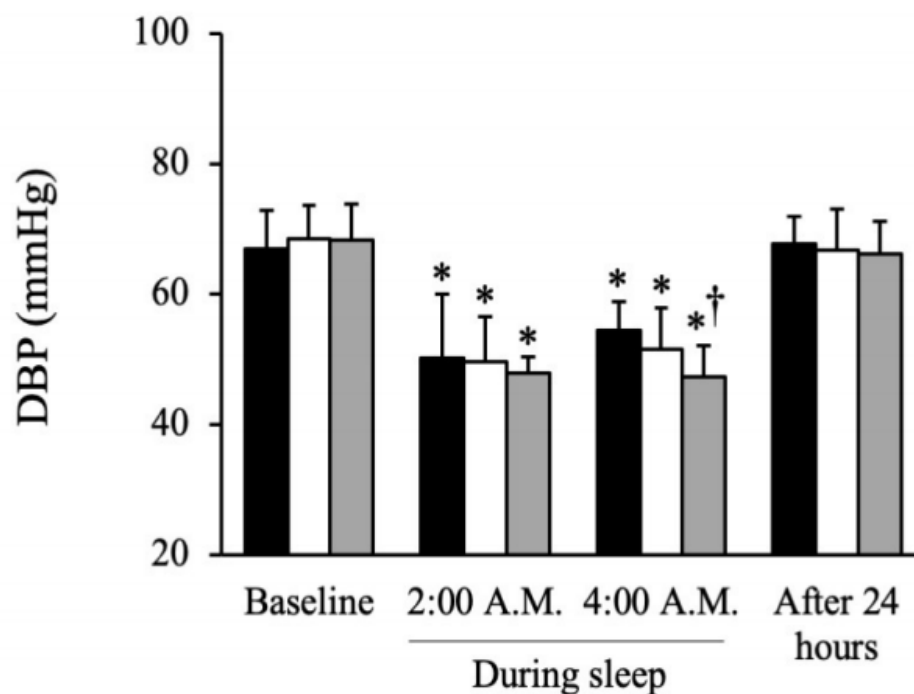


Fig. 2: Changes in blood pressure

values are expressed as mean $\pm$ standard deviation. sbp, systolic blood pressure; dbp, diastolic blood pressure; bt, breathing techniques; bt+non-led, breathing techniques+non-light emitting devices. *p<0.05 vs. baseline. †p<0.05 vs. con

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Work-Related Pneumoconiosis

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Summary- This paper is based on a general analysis of pneumoconiosis and how it is related to work. Breathing in solid particles can cause the lung disease pneumoconiosis. The inhalation of solid particles is what causes it. Exposure to particles such as asbestos, silica, and coal dust is discussed as a central factor in the genesis of the disease, resulting in complex and specific inflammatory and repair processes for each etiologic agent. The methodological design was a comprehensive literature review between the years 2000 and 2023; the texts chosen were in the English language and searched in PubMed and SciELO databases. Coal dust in mining represents a risk, especially for workers in coal transportation and use, as well as for those involved in mineral excavation and mining. Silicosis, a disease linked to miners, resurfaces due to a lack of understanding of modern work practices.

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I. INTRODUCTION

The study explores the etiology, pathophysiology, occupational effects, diagnosis, and treatment of pneumoconiosis. Asbestos, silica, and coal dust exposure become major topics of conversation, with a focus on how these sneaky particles can cause inflammation and repair through a complex and unique mechanism in each of the causes, leading to pneumoconiosis. A meticulous anamnesis, physical examination, imaging investigations, and laboratory tests are crucial for diagnosis and for determining the best course of action based on stopping the progression and exposure. In order to reduce the

dangers associated with pneumoconiosis, this analysis emphasizes the urgent need for education, strong regulation, and preventative measures.

II. METHODOLOGY

The SciELO and PubMed data sources served as the basis for this review of the literature. The search period was July 2023, and the inclusion criteria were full-text, online, English papers published from 2000 to 2023. To analyze the texts more effectively, the health descriptors "Pneumoconiosis," "Work," and "Exposure" were applied.

III. DISCUSSION

Breathing in solid particles causes a lung condition known as pneumoconiosis.¹ Particles such as asbestos, which causes asbestosis; silica, which causes silicosis; and coal dust are considered occupational risk factors for pneumoconiosis. Asbestos, silica, and coal dust exposure can result in pneumoconiosis due to the fibrotic degeneration of lung tissue.¹ Mechanisms like apoptosis, iron complexation, oxidative stress, and inflammation aid in this process.¹ Studies on animals indicate a link between these chemicals and pneumoconiosis.¹ Exposure to coal dust in mining can contain different types of coal, silicates, and asbestos fibers, depending on the specific mineral composition of the mined substance. The only risk that workers who transport bulk materials and use coal at work face is coal dust.² In addition, people who labor in coal mines and mineral extraction are the groups most harmed by coal dust exposure.²

The inhalation of inhalable crystalline silica particles causes silicosis, an ancient and potentially fatal pulmonary condition.² The historical documentation surrounding silicosis predominantly stems from the experiences of miners. However, the present-day resurgence of silicosis can be attributed to a dearth of awareness regarding contemporary occupational procedures, including but not limited to jeans sandblasting, the production of synthetic stone

countertops, construction laborers, individuals employed in the glass industry, as well as workers in the mining, oil, and gas extraction sectors, among various others.²

It is imperative to underscore the gravity of asbestos exposure, a substance that has already been prohibited in numerous nations owing to its inherent health hazards, notably pneumoconiosis. ² Occupations associated with potential asbestos exposure encompass construction workers, individuals employed in the automotive sector, personnel engaged in the oil and gas industry, workers handling insulation materials, textile industry professionals, and individuals involved in the removal of asbestos-containing materials from aged or contaminated structures.

The inflammatory process causes alveolitis and fibrosis, which are the pathophysiologies of pneumoconiosis.¹ Alveolar macrophages phagocytose silica granules or asbestos fibers after they enter the alveoli.¹ Alveolitis begins when macrophages that have been injured or activated emit cytotoxic oxidants, proteases, and inflammatory mediators that attract inflammatory cells to the alveolar wall and to the alveolar epithelial surface.¹ Although lymphocytes and neutrophils are also involved, alveolar macrophages are the primary cells that cause alveolitis.¹ Inflammatory mediators also increase the production of mucus in the airways.¹ After the inflammatory phase, the repair phase begins. During this phase, growth factors cause type II pneumocytes, fibroblasts, fibronectin, and collagen to recruit and multiply, which leads to fibrosis.

The most typical signs of pneumoconiosis include nodular opacities, fibrous masses, or scars in the lung tissues. The diagnosis of pneumoconiosis is made primarily based on questions about the work history, a physical exam, and imaging studies, which are initial instruments to assess the presence of pulmonary changes. ³ Pulmonary function tests can be done to check for irregular breathing patterns, decreased lung capacity, and blocked airways. ³ To determine whether inflammation is present, laboratory testing can also be used. In more complicated and uncommon circumstances, a biopsy may be required. ³

As there is no specific treatment for pneumoconiosis that may reverse the harm brought on by exposure, therapeutic strategies focus on symptom management and delaying the disease's progression. ⁵ The strategy involves removing exposure, treating symptoms, managing problems, and providing emotional and educational support. ⁵ The most important of the strategies is the implementation of safety precautions in the workplace, such as dust management, the use of personal protective equipment, a better ventilated environment, and routine worker health monitoring.

IV. FINAL CONSIDERATION

In conclusion, silica, asbestos, and coal are categorized as the main risks related to this exposure in the work environment, causing fibrotic degeneration of lung tissue. This is an important factor for the diagnostic questionnaire, and for treatment, it is necessary to stop the exposed occupation and provide symptomatic support. To reduce the effects and incidence of pneumoconiosis, it is therefore essential to be aware of its predisposing factors as well as its pathophysiology and prevention. It is also crucial to create safe working environments for employees' health, which calls for cooperation between the union of workers, health professionals, employers, and regulatory authorities.

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Use of Tranexamic Acid in Trauma in a Prehospital Context

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Abstract- Introduction: Tranexamic acid (TXA) is indicated for the control and prevention of hyperfibrinolysis-induced hemorrhages because it promotes increased clot stability. 11 Since its pre-hospital use is not yet well-defined, the purpose of this article is to evaluate the scientific research on its mechanism of action, indications, and contraindications to supplement the risk-benefit discussion.

Methodology: The current study is a literature review, the database of which was taken from the SciELO (Scientific Electronic Library Online) and PubMed platforms.

Keywords: tranexamic acid; trauma; pre-hospital.

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Methodology: The current study is a literature review, the database of which was taken from the SciELO (Scientific Electronic Library Online) and PubMed platforms.

Discussion: TXA is a synthetic antifibrinolytic that generates a temporary competitive action on the plasminogen binding sites. Patients with coagulopathy and severe trauma show the highest improvement in mortality with TXA use. Based on the results of the CRASH-2 trial, it is used in hospitalized trauma patients. TXA is administered intravenously over a period of ten minutes at a flow rate of ten milliliters per minute (1 g in 100 ml of saline solution). For each patient, a unique risk-benefit analysis should be conducted. Therefore, as long as site evacuation is not delayed, ATX is advocated as a workable choice for use in pre-hospital advanced life support.

Conclusion: The current scientific literature provides a comprehensive and well-supported explanation of the application of Tranexamic Acid (TXA) in medical settings. However, while tranexamic acid (TXA) has a lot of potential, there isn't enough research on how it can be used safely in prehospital settings.

Keywords: tranexamic acid; trauma; pre-hospital.

I. INTRODUCTION

Trauma is currently one of the leading causes of death worldwide and the number one killer of people between the ages of 1 and 44. 1 In a detailed analysis, the leading cause of death in trauma victims in the first 24 hours after injury is massive

bleeding. 2 The lethal diamond, composed of acidosis, hypothermia, coagulopathy, and hypocalcemia, determines the prognosis between life and mortality in polytraumatized patients in the context of trauma. The fatal diamond, which describes the mechanisms of action of diffuse intravascular coagulopathy, is the driving force behind current efforts to resuscitate hemorrhagic shock. 4 On this basis, tranexamic acid (TXA) has been investigated as an alternative pharmacological treatment for coagulopathy. TXA has demonstrated success in reducing trauma-related hemorrhages in a hospital context; however, its effectiveness in a pre-hospital setting is still up for discussion. 12 TXA is used to treat hereditary angioedema and control and prevent bleeding caused by hyperfibrinolysis. It is also used in many procedures, such as cardiac, orthopedic, gynecological, otorhinolaryngological, urological, and neurological surgeries. It is also used in patients with hemophilia and treatments of digestive and airway hemorrhages. 11

Tranexamic acid is a man-made form of the amino acid lysine. It is an antifibrinolytic agent that blocks the activation of plasminogen by plasmin and prevents the breakdown of fibrin through reversible interactions at several lysine binding sites on plasminogen. TXA promotes enhanced clot stability as a result. 11 As its prehospital use is still not clearly defined, this article seeks to evaluate the research on its mechanism of action, indications, and contraindications in order to encourage the discussion between risks and benefits.

II. METHODOLOGY

The current study is a literature review in which the database was taken from the SciELO (Scientific Electronic Library Online) and PubMed platforms. The research was carried out in July 2023, meeting the inclusion criteria, which were articles from 2006 to 2022 in Portuguese, Spanish, and English, online texts and full texts, theses, master's dissertations, book chapters, monographs, and literature in magazines and scientific journals. As strategies to better evaluate the readers, the health descriptors (DeCS) used were "tranexamic acid," "trauma," AND "pre-hospital."

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III. RESULTS AND DISCUSSION

Trauma is now understood to play a substantial role in death rates across the globe, particularly for people aged 1 to 44. It is currently the leading cause of death, accounting for around 18% of all illnesses worldwide. 1 Significant hemorrhaging may occur in patients who have undergone severe trauma and, along with hematological changes brought on by the medical procedures necessary to restore normal blood flow to vital organs, can result in coagulation disorders. If left untreated, this illness frequently poses management difficulties and may even be fatal.

The term "coagulopathy" describes the blood's inability to successfully establish hemostasis after tissue injury. 2 Effective surgical hemorrhage control is without a doubt the main determinant in preventing coagulopathy. Active bleeding from vascular damage calls for immediate treatment through vascular anastomosis or permanent closure of blood vessels. Direct compression applied to bleeding sites encourages the coagulation of damaged arteries and successfully reduces continuous blood loss. 2 The surgical management of bleeding, however, is only permitted in a hospital setting. Tranexamic acid (TXA) in particular is an antifibrinolytic that has been used as a method.

In the pre-hospital care phase, the primary goal is to effectively manage hemorrhaging in order to reduce associated mortality. 1

The synthetic antifibrinolytic substance tranexamic acid (TXA), which is similar to the amino acid lysine, is used to break down fibrin. Currently used for the control and prevention of bleeding, particularly in cases of trauma, it was initially synthesized in a lab setting in 1962. For patients with genetic coagulation problems, it is also used in elective surgical procedures. In both individuals with and without increased fibrinolysis, the mechanism of action involves encouraging better clot stability, which reduces blood loss by about 30%. Furthermore, research has shown that it can successfully reduce the volume of blood transfusions needed intrauma patients while maintaining a comparable level of pre- and post-operative complications. 1

The binding sites on the plasminogen particle are temporarily competitively inhibited as part of the mechanism of action. The plasminogen activating factor cannot attach to plasminogen as a result, and plasminogen cannot become plasmin. Plasmin has a major impact on fibrin and, to a lesser extent, fibrinogen during the fibrinolysis process. Its main purpose is to make blood clots easier to dissolve. Additionally, particularly at high dosages, tranexamic acid (TXA) inhibits plasmin non-competitively to exert its effects. 1, 13, 4, 14

Tranexamic acid (TXA) can reduce inflammation in another way by stopping plasminogen from adhering to polymorphonuclear leukocytes, monocytes, macrophages, and endothelial cells. As a result, this inhibition reduces the expression of leukotrienes, cytokines, and plasmin-mediated matrix breakdown. As a result, it prevents tissue plasminogen activator (t-PA) activity, granule release, and platelet activation. 1, 13

The most significant improvement in mortality rates is observed in patients with pre-existing coagulopathy and severe trauma when using TXA. 4 It has been observed that variations in patients' initial systolic pressure do not result in statistically significant differences in mortality related to bleeding. It suggests that TXA demonstrates effectiveness across all levels of shock, indicating that its biological impact is consistent among patients, irrespective of their systolic pressure. As a result, it appears that the disparity in overall death rates between the most seriously ill and the general population is primarily the result of statistical error due to the higher death rate among the critically ill. 4 It is prudent to consider administering treatment to all shock groups, as doing so may prevent patients with less severe conditions from developing grade III or IV shock due to ongoing blood loss, thereby necessitating the use of TXA. Given the clear association between the early delivery of tranexamic acid and improved clinical outcomes, this approach seems to be quite effective. 4

The CRASH-2 study provided the scientific literature for the use of TXA in hospitals. It was the largest study on TXA and concluded that there was a 15% benefit in reducing mortality in patients who received 1g of the drug in the first 3 hours after trauma. It also demonstrated a reduction in all-cause mortality at 28 days in patients who received TXA (1463 patients who received TXA vs. 1613 who received placebo). 12 acid within three hours of their injury. 6 According to the guidelines set forth by Advanced Trauma Life Support (ATLS), it is recommended to administer tranexamic acid promptly to trauma patients displaying indications of hypovolemic shock. 7 Antifibrinolytic medications, such as tranexamic acid (TXA), have demonstrated efficacy in reducing local bleeding in patients with upper gastrointestinal bleeding, thereby contributing to improved mortality outcomes. 8

As per the Health Care Protocol for the Use of Tranexamic Acid by Advanced Support Units, established by the Federal District Government, the recommended administration regimen for TXA is as follows: 1g (equivalent to 4 ampoules of 250mg) diluted in 100 ml of saline solution. The administration should be done intravenously over a period of 10 minutes, with a flow rate of 10 ml per minute. Regarding treatment duration and criteria for interruption, it is recommended to administer a single dose during pre-hospital care. In the event of a suspected adverse event, such as nausea, vomiting, hypotension, reduced heart rate, skin allergy,

headache, visual clouding, or thromboembolism, the drug infusion should be promptly halted. The anticipated advantage is a decrease in mortality rates resulting from hemorrhaging. It is recommended to ensure continuous multiparametric monitoring of the patient until they are admitted to the hospital, while also closely observing for any adverse reactions. Furthermore, the attending hospital team is responsible for conducting post-treatment follow-up.¹⁰

This drug is generally contraindicated for hospital use in patients who have active intravascular coagulation, acute occlusive vasculopathy, or hypersensitivity to any of the components in the formula.¹¹

Tranexamic acid is distributed within various bodily fluids, including synovial membranes, saliva, and breast milk, albeit in limited quantities. Furthermore, it has the ability to traverse both the blood-brain barrier and the placenta. Furthermore, ATX undergoes minimal metabolism and is primarily excreted through the renal route.¹¹

Regarding drug interactions, there have been reports indicating the following: 1) The use of contraceptives may lead to a heightened risk of thrombotic events. It is advised to refrain from using tranexamic acid simultaneously with any hormonal contraceptives and instead opt for an effective alternative non-hormonal contraceptive method. 2) Tretinoin usage may potentially elevate the risk of thrombosis. It is important to closely observe the patient for any indications or manifestations of thromboembolic complications. Additionally, it should be noted that the use of chlorpromazine may potentially elevate the risk of bleeding. Please ensure diligent observation of the patient for any indications or manifestations of bleeding.¹¹ It is recommended that pre-hospital advanced life support providers, such as SAMU, consider utilizing this option in the trauma setting, as long as it does not cause any delays in evacuation. This is in line with the continuous efforts to enhance survival rates among hemorrhaging patients.⁹

IV. FINAL CONSIDERATIONS

Considering the significance of coagulopathy in the context of trauma and massive hemorrhage, it is crucial to prioritize the identification of financially feasible, minimally invasive, and clinically effective solutions. The existing scientific literature provides a thorough description and justification for the use of tranexamic acid (TXA) in hospital settings. However, in the context of prehospital use, the current body of literature is still limited and does not provide sufficient evidence to support the safe administration of TXA in this particular scenario, despite the overall promising nature of TXA. The limited availability of data regarding

the effectiveness and safety of this intervention underscores the necessity for further research in order to establish its suitability for pre-hospital use and thoroughly assess its potential risks and benefits.

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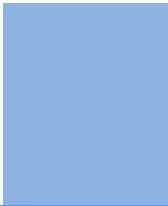
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20. Think technically: Always think technically. If anything happens, search for its reasons, benefits, and demerits. Think and then print: When you go to print your paper, check that tables are not split, headings are not detached from their descriptions, and page sequence is maintained.

21. Adding unnecessary information: Do not add unnecessary information like "I have used MS Excel to draw graphs." Irrelevant and inappropriate material is superfluous. Foreign terminology and phrases are not apropos. One should never take a broad view. Analogy is like feathers on a snake. Use words properly, regardless of how others use them. Remove quotations. Puns are for kids, not grunt readers. Never oversimplify: When adding material to your research paper, never go for oversimplification; this will definitely irritate the evaluator. Be specific. Never use rhythmic redundancies. Contractions shouldn't be used in a research paper. Comparisons are as terrible as clichés. Give up ampersands, abbreviations, and so on. Remove commas that are not necessary. Parenthetical words should be between brackets or commas. Understatement is always the best way to put forward earth-shaking thoughts. Give a detailed literary review.

22. Report concluded results: Use concluded results. From raw data, filter the results, and then conclude your studies based on measurements and observations taken. An appropriate number of decimal places should be used. Parenthetical remarks are prohibited here. Proofread carefully at the final stage. At the end, give an outline to your arguments. Spot perspectives of further study of the subject. Justify your conclusion at the bottom sufficiently, which will probably include examples.

23. Upon conclusion: Once you have concluded your research, the next most important step is to present your findings. Presentation is extremely important as it is the definite medium through which your research is going to be in print for the rest of the crowd. Care should be taken to categorize your thoughts well and present them in a logical and neat manner. A good quality research paper format is essential because it serves to highlight your research paper and bring to light all necessary aspects of your research.

INFORMAL GUIDELINES OF RESEARCH PAPER WRITING

Key points to remember:

- Submit all work in its final form.
- Write your paper in the form which is presented in the guidelines using the template.
- Please note the criteria peer reviewers will use for grading the final paper.

Final points:

One purpose of organizing a research paper is to let people interpret your efforts selectively. The journal requires the following sections, submitted in the order listed, with each section starting on a new page:

The introduction: This will be compiled from reference matter and reflect the design processes or outline of basis that directed you to make a study. As you carry out the process of study, the method and process section will be constructed like that. The results segment will show related statistics in nearly sequential order and direct reviewers to similar intellectual paths throughout the data that you gathered to carry out your study.

The discussion section:

This will provide understanding of the data and projections as to the implications of the results. The use of good quality references throughout the paper will give the effort trustworthiness by representing an alertness to prior workings.

Writing a research paper is not an easy job, no matter how trouble-free the actual research or concept. Practice, excellent preparation, and controlled record-keeping are the only means to make straightforward progression.

General style:

Specific editorial column necessities for compliance of a manuscript will always take over from directions in these general guidelines.

To make a paper clear: Adhere to recommended page limits.



Mistakes to avoid:

- Insertion of a title at the foot of a page with subsequent text on the next page.
- Separating a table, chart, or figure—confine each to a single page.
- Submitting a manuscript with pages out of sequence.
- In every section of your document, use standard writing style, including articles ("a" and "the").
- Keep paying attention to the topic of the paper.
- Use paragraphs to split each significant point (excluding the abstract).
- Align the primary line of each section.
- Present your points in sound order.
- Use present tense to report well-accepted matters.
- Use past tense to describe specific results.
- Do not use familiar wording; don't address the reviewer directly. Don't use slang or superlatives.
- Avoid use of extra pictures—include only those figures essential to presenting results.

Title page:

Choose a revealing title. It should be short and include the name(s) and address(es) of all authors. It should not have acronyms or abbreviations or exceed two printed lines.

Abstract: This summary should be two hundred words or less. It should clearly and briefly explain the key findings reported in the manuscript and must have precise statistics. It should not have acronyms or abbreviations. It should be logical in itself. Do not cite references at this point.

An abstract is a brief, distinct paragraph summary of finished work or work in development. In a minute or less, a reviewer can be taught the foundation behind the study, common approaches to the problem, relevant results, and significant conclusions or new questions.

Write your summary when your paper is completed because how can you write the summary of anything which is not yet written? Wealth of terminology is very essential in abstract. Use comprehensive sentences, and do not sacrifice readability for brevity; you can maintain it succinctly by phrasing sentences so that they provide more than a lone rationale. The author can at this moment go straight to shortening the outcome. Sum up the study with the subsequent elements in any summary. Try to limit the initial two items to no more than one line each.

Reason for writing the article—theory, overall issue, purpose.

- Fundamental goal.
- To-the-point depiction of the research.
- Consequences, including definite statistics—if the consequences are quantitative in nature, account for this; results of any numerical analysis should be reported. Significant conclusions or questions that emerge from the research.

Approach:

- Single section and succinct.
- An outline of the job done is always written in past tense.
- Concentrate on shortening results—limit background information to a verdict or two.
- Exact spelling, clarity of sentences and phrases, and appropriate reporting of quantities (proper units, important statistics) are just as significant in an abstract as they are anywhere else.

Introduction:

The introduction should "introduce" the manuscript. The reviewer should be presented with sufficient background information to be capable of comprehending and calculating the purpose of your study without having to refer to other works. The basis for the study should be offered. Give the most important references, but avoid making a comprehensive appraisal of the topic. Describe the problem visibly. If the problem is not acknowledged in a logical, reasonable way, the reviewer will give no attention to your results. Speak in common terms about techniques used to explain the problem, if needed, but do not present any particulars about the protocols here.



The following approach can create a valuable beginning:

- Explain the value (significance) of the study.
- Defend the model—why did you employ this particular system or method? What is its compensation? Remark upon its appropriateness from an abstract point of view as well as pointing out sensible reasons for using it.
- Present a justification. State your particular theory(-ies) or aim(s), and describe the logic that led you to choose them.
- Briefly explain the study's tentative purpose and how it meets the declared objectives.

Approach:

Use past tense except for when referring to recognized facts. After all, the manuscript will be submitted after the entire job is done. Sort out your thoughts; manufacture one key point for every section. If you make the four points listed above, you will need at least four paragraphs. Present surrounding information only when it is necessary to support a situation. The reviewer does not desire to read everything you know about a topic. Shape the theory specifically—do not take a broad view.

As always, give awareness to spelling, simplicity, and correctness of sentences and phrases.

Procedures (methods and materials):

This part is supposed to be the easiest to carve if you have good skills. A soundly written procedures segment allows a capable scientist to replicate your results. Present precise information about your supplies. The suppliers and clarity of reagents can be helpful bits of information. Present methods in sequential order, but linked methodologies can be grouped as a segment. Be concise when relating the protocols. Attempt to give the least amount of information that would permit another capable scientist to replicate your outcome, but be cautious that vital information is integrated. The use of subheadings is suggested and ought to be synchronized with the results section.

When a technique is used that has been well-described in another section, mention the specific item describing the way, but draw the basic principle while stating the situation. The purpose is to show all particular resources and broad procedures so that another person may use some or all of the methods in one more study or referee the scientific value of your work. It is not to be a step-by-step report of the whole thing you did, nor is a methods section a set of orders.

Materials:

Materials may be reported in part of a section or else they may be recognized along with your measures.

Methods:

- Report the method and not the particulars of each process that engaged the same methodology.
- Describe the method entirely.
- To be succinct, present methods under headings dedicated to specific dealings or groups of measures.
- Simplify—detail how procedures were completed, not how they were performed on a particular day.
- If well-known procedures were used, account for the procedure by name, possibly with a reference, and that's all.

Approach:

It is embarrassing to use vigorous voice when documenting methods without using first person, which would focus the reviewer's interest on the researcher rather than the job. As a result, when writing up the methods, most authors use third person passive voice.

Use standard style in this and every other part of the paper—avoid familiar lists, and use full sentences.

What to keep away from:

- Resources and methods are not a set of information.
- Skip all descriptive information and surroundings—save it for the argument.
- Leave out information that is immaterial to a third party.



Results:

The principle of a results segment is to present and demonstrate your conclusion. Create this part as entirely objective details of the outcome, and save all understanding for the discussion.

The page length of this segment is set by the sum and types of data to be reported. Use statistics and tables, if suitable, to present consequences most efficiently.

You must clearly differentiate material which would usually be incorporated in a study editorial from any unprocessed data or additional appendix matter that would not be available. In fact, such matters should not be submitted at all except if requested by the instructor.

Content:

- o Sum up your conclusions in text and demonstrate them, if suitable, with figures and tables.
- o In the manuscript, explain each of your consequences, and point the reader to remarks that are most appropriate.
- o Present a background, such as by describing the question that was addressed by creation of an exacting study.
- o Explain results of control experiments and give remarks that are not accessible in a prescribed figure or table, if appropriate.
- o Examine your data, then prepare the analyzed (transformed) data in the form of a figure (graph), table, or manuscript.

What to stay away from:

- o Do not discuss or infer your outcome, report surrounding information, or try to explain anything.
- o Do not include raw data or intermediate calculations in a research manuscript.
- o Do not present similar data more than once.
- o A manuscript should complement any figures or tables, not duplicate information.
- o Never confuse figures with tables—there is a difference.

Approach:

As always, use past tense when you submit your results, and put the whole thing in a reasonable order.

Put figures and tables, appropriately numbered, in order at the end of the report.

If you desire, you may place your figures and tables properly within the text of your results section.

Figures and tables:

If you put figures and tables at the end of some details, make certain that they are visibly distinguished from any attached appendix materials, such as raw facts. Whatever the position, each table must be titled, numbered one after the other, and include a heading. All figures and tables must be divided from the text.

Discussion:

The discussion is expected to be the trickiest segment to write. A lot of papers submitted to the journal are discarded based on problems with the discussion. There is no rule for how long an argument should be.

Position your understanding of the outcome visibly to lead the reviewer through your conclusions, and then finish the paper with a summing up of the implications of the study. The purpose here is to offer an understanding of your results and support all of your conclusions, using facts from your research and generally accepted information, if suitable. The implication of results should be fully described.

Infer your data in the conversation in suitable depth. This means that when you clarify an observable fact, you must explain mechanisms that may account for the observation. If your results vary from your prospect, make clear why that may have happened. If your results agree, then explain the theory that the proof supported. It is never suitable to just state that the data approved the prospect, and let it drop at that. Make a decision as to whether each premise is supported or discarded or if you cannot make a conclusion with assurance. Do not just dismiss a study or part of a study as "uncertain."



Research papers are not acknowledged if the work is imperfect. Draw what conclusions you can based upon the results that you have, and take care of the study as a finished work.

- o You may propose future guidelines, such as how an experiment might be personalized to accomplish a new idea.
- o Give details of all of your remarks as much as possible, focusing on mechanisms.
- o Make a decision as to whether the tentative design sufficiently addressed the theory and whether or not it was correctly restricted. Try to present substitute explanations if they are sensible alternatives.
- o One piece of research will not counter an overall question, so maintain the large picture in mind. Where do you go next? The best studies unlock new avenues of study. What questions remain?
- o Recommendations for detailed papers will offer supplementary suggestions.

Approach:

When you refer to information, differentiate data generated by your own studies from other available information. Present work done by specific persons (including you) in past tense.

Describe generally acknowledged facts and main beliefs in present tense.

THE ADMINISTRATION RULES

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CRITERION FOR GRADING A RESEARCH PAPER (COMPILATION)
BY GLOBAL JOURNALS

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Topics	Grades		
	A-B	C-D	E-F
<i>Abstract</i>	Clear and concise with appropriate content, Correct format. 200 words or below	Unclear summary and no specific data, Incorrect form Above 200 words	No specific data with ambiguous information Above 250 words
<i>Introduction</i>	Containing all background details with clear goal and appropriate details, flow specification, no grammar and spelling mistake, well organized sentence and paragraph, reference cited	Unclear and confusing data, appropriate format, grammar and spelling errors with unorganized matter	Out of place depth and content, hazy format
<i>Methods and Procedures</i>	Clear and to the point with well arranged paragraph, precision and accuracy of facts and figures, well organized subheads	Difficult to comprehend with embarrassed text, too much explanation but completed	Incorrect and unorganized structure with hazy meaning
<i>Result</i>	Well organized, Clear and specific, Correct units with precision, correct data, well structuring of paragraph, no grammar and spelling mistake	Complete and embarrassed text, difficult to comprehend	Irregular format with wrong facts and figures
<i>Discussion</i>	Well organized, meaningful specification, sound conclusion, logical and concise explanation, highly structured paragraph reference cited	Wordy, unclear conclusion, spurious	Conclusion is not cited, unorganized, difficult to comprehend
<i>References</i>	Complete and correct format, well organized	Beside the point, Incomplete	Wrong format and structuring



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