Cognitive ability to improve driving in aging adults suffering with visual and hearing impairments with yoga and exercise

Sheshikala Martha¹, SyedMusthak Ahmed², G.Jose Mary³, Bonthala Prabhanjan Yadav⁴, S.Gouthamî, M. Sridevi⁶

¹ School of Computer Science & Artificial Intelligence, S R University, Warangal, Telngana, India
²Professor & Dean, Department of ECE, S R University, Warangal, Telangana, India,
³Jayamukhi Institute of Technological Sciences, Department of CSE, Warangal, Telanagana, India.
⁴Sumathi Reddy Institute of Technology for Women, Warangal, Telanagana, India.
⁵Jayamukhi Institute of Technological Sciences, Department of CSE, Warangal, Telanagana, India.
⁶Anurag University, Department of CSE, Hyderabad, Telanagana, India

E-mail: marthakala08@gmail.com,

Abstract: Visual and Hearing impairments are the one of the major cause for accidents. In this paper we discuss the major impacts of Visual and Hearing Impact while driving and the remedies that can be used to provide the solution to the Problem. Impairment can be defined as the abnormality or mis-functionality of a physical body or a system. We discuss the types of disease that are affecting both vision and hearing impairment and the types of exercises that are required to overcome these diseases empowering Cognitive Abilities. Yoga plays a major in improving the strength of Visual and Hearing impairments, so we discuss the exercises that are required to improve the impairments.

1. Introduction
The following Section 1.1 and 1.2 describes about the impact of hearing and vision impairments in the process of driving.

1.1 Impact of hearing impairments while driving:
A case – control study gave the relationship between chronic medical conditions or impairments and motor vehicle crashes. A sample of 1400 male drivers (of all aged 70) who had a crash resulting in mild body injury or property damage between 1988 – 1989. Compared to same aged controls, cases with hearing impairments were not at increased risk for crashes (OR = 0.90, CI = 0.65-1.24). Importantly, male drivers involved in crashes causing death or causing severe bodily damage were excluded from the study. Exclusion of those cases may have led to an underestimation of the true relative risk of crashes, particularly for crashes associated with other medical impairments (e.g., cardiovascular disease, diabetes mellitus). The only channel which helps us to listen to any sound in the
world is ear, in specific ear drum. The smallest bone of the body is stapes and which is responsible in
converting sound waves and transfer them into the inner ear. Hearing impairment itself indicates that
the abnormality in the functioning of the ear. Damage in any part of the ear causes different kinds of
hearing impairments in accordance the damage occurred.

1.2 Impact of vision impairments while driving:
Most of the people whose visual impairment cannot be corrected are not advisable to drive but in some
diseases like retinitis pigmentosa, cataract, Diabetic retinopathy people can drive but need some
medical aid like glasses or surgery correction. Additionally many people who aren’t having any kind of
impairments also face few kinds of visual problems due to lack of proper sleep or work stress and any
other issues and can overcome these by doing some kind of exercise, yoga or taking some kind
physiotherapy treatment

2. Visual impairment:
Visual impairment is abnormality of vision and there are two types of visual impairment. 1. Correctable
visual impairment such as Myopia, Hyperopia, and corneal related problems can be
corrected using glasses, lens and surgeries and 2. Non correctable visual impairment such as Visual
impairments which cannot be corrected by any means or by any methods come under this section for
Eg: Diabetic Retinopathy, Retinitis Pigmentosa.. Etc[7].

2.1 Measurement of visual acuity:
Visual Acuity is measured as 20/20, 20/70, 20/200……. First number indicates the distance between
the eye and the object whereas the second number indicates where a person with perfect or normal
vision would stand to be able to see the object. For example, 20/400 be the measurement. Quality of
vision is measured at 20 feet- this is the numerator. The denominator (400) is a comparison to
someone with standard vision. So if you have 20/400 vision you should have to be at 20 feet to see
what once with standard vision would see at 400 feet. Larger the second number, more reduced the
distance acuity a person has.

2.1.1 Moderate visual impairment:
Snellen visual activity: 20/70 to 20/160

2.1.2 Severe visual impairment:
Snellen visual activity 20/200 to 20/400 or visual field of 20 degree or less

2.1.3 Profound visual impairment:
Snellen visual activity: 20/500 to 20/1000 or visual field of 10 degrees or less

On the whole low visual acuity is vision between 20/70 and 20/400(moderate) and people having
visual acuity wore than 20/400 or visual field of 10 degrees or less are known as blind[6].

2.2 Correctable visual impairments:

2.2.1 Astigmatism:
This is a condition in which the curvature of the cornea causes two focal points fall in two different
location instead of one which indeed causes a blurred vision with the objects near or far based on
the location of focal point fall

2.2.2 Myopia:
Can also be called as Near Sightedness where the person with this kind of impairment cannot see the objects which are far away from him and the maximum distance he can see clearly depends on the snellen visual acuity reading.

2.2.3 Hyperopia
It can also be called as far sightedness where the person with this kind of impairment will face problem in seeing the objects near to their eyes, similarly like myopia the level of impairment depends on the snellen visual acuity reading.

2.2.4 Corneal thinning
This is a rear eye condition where the person’s corneal thickness reduces gradually with time and their myopia or hyperopia levels rises in accordance to the reduce in the corneal thickness and has to take continuous medications to recover from the situation.

All the above impairment can be corrected using with the help of convex or concave lenses, progressive lens, contact lenses and surgeries like Laser (LASIK, PRK), ICL (Implantable contact lenses)

2.3 Non correctable visual impairments:
In this condition the impairment cannot be corrected with a single surgery or require a lot amount of time and medication or sometimes these cannot be completely corrected.

2.3.1 Glaucoma
Human eye contains some fluids and some kind of pressure on the walls of eye which is called ocular pressure, the rise or fall in those pressures causes this impairment. The intact vision remains within the center whereas more and more the peripheries begin decreasing. The center of the tunnel reduces in size more and more until total vision is lost if left uncorrected.

2.3.2 Age related macular degeneration:
A wool like opacity is observed on the eye ball which effects the central vision causing a blurred vision and effects activities which needs a close vision like sewing, reading, driving.

2.3.3 Cataract
Generally caused in old aged people where a cloudy layer form upon the retina obstructing the vision and may spread till the vision is completely lost and needs immediate correction using a surgery. Cataract dose not affect visual field in terms of myopia and Hyperopia.

2.3.4 Diabetic retinopathy
This is generally caused in people having diabetes. In this smaller blood vessels present in the back of retina gets damaged causing spots or floating objects in the visual field.

2.3.5 Retinitis pigmentosa
This a kind of genetical disorder where in the person is initially effected with night blindness and as the impairment progresses tunneling effects takes place with loss of central or peripheral vision, followed by complete blindness[7][8].

There are many undiagnosed visual impairments but there is no reason or specific information regarding them and still a varied research is going on in order to find the causes and effects.

3. Hearing

3.1 Types of hearing impairments:
3.1.1 Otosclerosis:
One of the back conditions in hearing impedances and this happens when stapes – the bone which is capable of hearing stalls out without vibrating or moving. This happens when the bone tissue develops in the ear around the stapes, confining its development and causing obstacle in move of sound waves into the inward ear [3].

3.1.2 Vestibular system disorder:
The vestibular framework contains internal pieces of the ear and the tactile nerves which instigates data to the mind. On the off chance that any piece of the vestibular framework gets harmed or harmed that outcomes in vestibular framework issue.

3.1.3 Middle ear infections
Center ear contaminations are the most widely recognized issue in the vast majority of the individuals, this is brought about by the liquid of germs (Pus) which got settled in the center ear, it is called swimmers ear, causing individuals a consultation impedances somewhat[17].

3.1.4 Meniere's disease
This is the regular hearing weaknesses; this is illness happens in internal ear that causes unconstrained scenes of vertigo, alongside variances in hearing, tinnitus.

3.1.5 Otitis disorder
Otitis Disorder is an aggravation might be a general term for contamination or irritation of the ear. Aggravation will affect the internal or external parts of the ear. The condition is evaluated in accordance with whether it happens out of nowhere and for a short time (intense) or more than once over an extended measure of your time (ceaseless). When irritation includes the outer organ and sound-related meatus, it's alluded to as aggravation outside or commonly alluded to as swimmer's ear[9].

3.2 Impact of hearing while driving:
Touch, vision, taste, hearing, smell are the five senses, Out of which vision and hearing play an important role while driving and in many other activities.[16] Driving needs safety and to drive safely every individual need to have concentration while driving and there are many reasons where the concentration of a person gets deviated, For Example: Pillion riders, mental ability, listening to music etc.

4. Exercises to improve vision and hearing impairment:
The Section 4.1 and 4.2 describes different exercises to improve vision and overcome Hearing Impairment:

4.1 Exercises to improve vision:
Throughout human body eye muscles which are also known as extraocular muscles are one of the most sensitive muscles which helps eye ball maintain its pace of movement to any direction and helps in opening and closing of eye lids. People who get stressed feel some kind of strain in ocular muscles which indeed affects their vision make it blurred to some extent. To overcome this problem few kind of eye exercise has to be done[15].

4.1.1 Palm Rubbing: Rub the palms of your hands shrewdly, till they're warmth and spot them delicately over your eyelids. Let the glow of the palms move onto the eyes. You can feel the consideration muscles unwind as your eyes acknowledge help inside the obscurity. Persevere till the glow from the hands has been completely consumed by the eyes. Rehash a few times [4].
4.1.2 Blinking
Sit easily with your eyes open. Flicker 10-15 times rapidly. Close your eyes and unwind for 20 seconds. Rehash this 4-5 times.

4.1.3 Zooming
Another compelling activity for the eyes is zooming. As you can figure from the name, you make an item zoom for your eyes in order to move the focal point of your vision. Sit on a seat with your arm outstretched and your thumb up. Presently, twist your arm a little bit at a time and attract it closer to your eyes, in this way zooming the thumb in center.

4.1.4 Shifting
Moving is concerning moving or pivoting your eyeballs from one heading to an alternate. Look to your rightward corner so move your look a little bit at a time to the elective bearing. The little eye muscles get a ton of dynamic and solid with the spray of blood tense in from the moving.

4.1.5 Figure of eight
Sit with legs straight before your body with the left hand on the left knee. Hold the correct clench hand over the correct knee, with a straight elbow and the thumb pointing upwards. Keep your head still and spotlight your eyes on the thumb. Draw a figure eight along with your thumb, keeping the elbow straight constantly. Rehash this activity multiple times each in clockwise and hostile to clockwise bearing. Next recurrent the procedure with the left thumb

4.2 Exercises for hearing impairment:

4.2.1 Rotation of head:
This yoga practice for clear hearing is sufficiently direct to attempt to do wherever. Basically pivot your head to one side, at that point to one side, as though you're gradually shaking your head. Go as far as possible on either side without over-extending or causing torment. Rehashing this move a couple of times every day can help stretch your neck and shoulder muscles while expanding blood stream to your ears and different regions[1].

4.2.2 Neck flexion and extension
Next, play out a comparative exercise going here and there instead of side to side – simply like that is no joke.” “Fold your jaw as you look down, at that point gradually raise your head until you're taking a gander at the sky or roof. Notwithstanding likely raising your hearing, this yoga posture can likewise help increment your scope of movement and diminish neck torment[12][14].

4.2.3 Legs up the wall
In this remedial reversal present, you'll set down close to a divider, tree, or another solid surface. Stretch your advantages the divider and delicately loosen up your body for as long as 15 minutes. Not exclusively will this posture help increment dissemination, yet it can likewise decrease expanding and channel strain in your legs and feet, and quiet the sensory system[18][19].

4.2.4 Downward-facing dog
Another in every one of the delicate yoga practices for higher hearing is Downward-Facing Dog. To get into this position, start on all fours. Tenderly raise your knees and stretch your tailbone. Push the most elevated of your thighs back and fix your knees to an agreeable position while interlocking them.

4.2.5 Cobra:
Channel your inward snake with this posture and lift dissemination of the blood. Start by lying on your mid-region. At that point, place your hands underneath your shoulders (like a pushup), and raise your
head, neck, and body the most extreme. This mellow yoga cause for higher hearing and furthermore extends the shoulders, chest, and muscular strength, and helps clear the sections inside the heart and lungs.

4.2.6 Tree
This delegate yoga produce might be a legit because of improve your parity while what's more expanding your dissemination Stand straight, rest your palms along before of your chest or raise your arms higher than your head Then, lift one leg and lay it on the contrary skimming joint, calf, or thigh. Clutch a near to divider whenever required. Inhale profoundly through your nose while you hold the produce. At that point, raise one leg and lay it on the contrary skimming joint, calf, or thigh Hold on to a near to divider whenever required. Inhale profoundly through your nose while you hold the produce[11][13].

| Name of the Yoga Asana                          | Picture | Benefit                                           |
|------------------------------------------------|---------|--------------------------------------------------|
| Karnapidasana (Ear Pressure Pose)               | ![Karnapidasana](image) | Pressure in ears is controlled as the Spine is Stretched |
| SukshmaVyayamaKriya                             | ![SukshmaVyayamaKriya](image) | It aerates the middle ear system and clears mucus from the middle ear into the nasopharynx. |
| Article I. Bhamari Pranayama (Honey Bee Breathing) | ![Article I. Bhamari Pranayama](image) | It converts and Amplifies vibration in air to vibration in fluid |
5. **Yogaasans and benefits**

Table 1 shows different yoga asans which helps to overcome Vision and Hearing Impairment to strength the driving capabilities[2]

6. **Conclusion**

In this paper we discussed how to strength the Cognitive to improve hearing and Vision by Yoga Exercise. This exercises helps the human life to improve their vision and hearing capability which helps to improve their driving capability. To the extension few more exercises can also be added.

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