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"Exploring Ayurvedic Approaches to Sensory Neural Deafness: A Detailed Study on Karnapooran and Kriyakalpa"

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ABSTRACT

The following cross-sectional study aims to explore the effectiveness of Ayurvedic system of treatment, namely Karnapooran and Kriyakalpa in the topic of sensory neural deafness. Hypothesis Testing Through a mixture of correlational and experimental designs, the study sought to assess the effectiveness of the hearing aid device on the patient's auditory function as well as their general quality of life. Out of sixty patients of sensory neural deafness, these patients availed these Ayurvedic therapies for a period of six months. Research findings highlighted the improved hearing thresholds of the patients by an average of 25 dB (0. 01 level). Moreover, 70% of patients mentioned a big improvement in the tinnitus annoyance and significant THI improvement with 30 points drop, on average. The study also pointed that such therapies also have broader effects on the individuals such as improvement in the mental health and the decreased levels of anxiety. These findings, therefore, support the possibilities of conducting research to use Ayurvedic therapies in combination with the existing medical models for treating sensory neural deafness. More studies should be done for the formulation of these protocols and determination of sustained effectiveness.

INTRODUCTION

Sensory neural deafness is also referred to as sensorineural hearing loss (SNHL), which is an actual common auditory pathology caused by the damage to the inner ear or the nerve conducting the auditory impulses to the cerebral cortex. This condition can seriously affect the capacity to communicate and overall, the quality of life. Current treatments of SNHL include hearing aids, cochlear implants, or drugs which sometimes might not work on all the patients or cost a lot of money to acquire. Thus, there is an emerging trend to discuss other approaches to its treatment and use non-conventional remedy like Ayurveda [1]. The most common form of traditional medicine which is prominently used in India is called Ayurveda; it aims at maintaining the equilibrium of the physiological states of the human body referred to as doshas. Among all the treatments, Karnapooran and Kriyakalpa are two specific treatments for the ear diseases and disorders of SNLD include. Karnapooran entails the use of oily substances, which are medicated or containing extracts from tropical herbs; this procedure is effectuated within the ear canal as it is thought to feed the ear and amplify its hearing functionality [2]. Conversely, Kriyakalpa involves several types of therapeutic procedures that help in purification of some of the sensory organs and hence enhances their function. The objective of this research is to offer a focused outlook at the effectiveness of Karnapooran and Kriyakalpa for the cure of sudden sensorial neuronal hearing loss. In order to achieve the goal of this study, the researcher wishes to gather data from both the early Ayurveda literature, recent literature, as well as from clinical reports. The effectiveness of these Ayurvedic treatments will also be analyzed focusing on the connection between the various treatments, their therapeutic effects and the possible drawbacks of this kind of therapy enabling practitioners and patients to gain a better understanding on this form of treatment [3]. As integrative medicine is on the rise in the current world, this work proves the essence of further research and validation of complementary medicine practices. Thus, it contributes to the development of the more inclusive and diversified approach to the management of sensory neural deafness, which, in turn, can ultimately have the positive impact on patients' outcome and the availability of the new therapeutic tools.

II. RELATED WORKS

Herbal therapies have always formed a key part in Traditional Medicine System especially in the treatment of disorders of the Special Senses including hearing difficulties. Analyzing data from survey, there were few papers which focus on the possible cure of hearing impairment and other auditory disorders through Ayurvedic treatments like Karnapooran and Kriyakalpa and along with other effective holistic approaches. Rani et al. (2020) have done a conceptual study on environmental hazards effects on hearing. They stepped up their critical analysis of the impact of different forms of environmental stressors that affect the auditory health of people such as noise pollution and toxic substances. Thus, this study offers a vital framework of complicating factors contributing to the growing cases of hearing impairments and thus elucidates the need for proper treatment methodologies such as Ayurveda interventions [10]. In their literary analysis of the impacts of Anu Tail Nasya, an Ayurvedic nasal treatment, Panwar et al. (2021) gave a vast listing of illnesses impacted by it. As per their review the applicability of Anu Tail Nasya oil while

expounding the tool in cerebral fluid circulation and the elimination of blockage in the auditory tracts ultimately leading to optimization of auditory functionality [11]. Likewise, Ahirwar and Kumar have reviewed the understanding of otorrhea and its treatment wise from the ancient Indian subcontinent. They described the use of many Ayurvedic medicines for ear discharge which can be linked modern concepts of audio-logical health and cleanliness [12]. The practices of Karnapooran and Kriyakalpa have been studied concerning the specific treatment of the ear diseases and conditions. Khosla and Jain (2024) carried out a case study on the management of Karnanada (Tinnitus) employing medicines stated in Ayurveda. From the results, they noted that Karnapooran herbal medicine might lessen tinnitus symptoms dramatically to offer comfort and enhance patients' quality of life [14]. Thus, the study by Mamidi and Gupta (2020) covered many neurological disorders mentioned in Charaka Indriya Sthana, including hearing impairment; the authors explained how Ayurvedic principles could be used to address these disorders efficiently [15]. Kumawat et al. , (2020) discussed descriptive knowledge of Panchakarma that is an Ayurvedic cleansing protocol in neuro-developmental disorders. They also suggested that the treatments like Kriyakalpa under Panchakarma can take a restructuring impact on the sensory organs thus having a beneficial effect on SNHL namely, Sn Doug's sensory neural deafness [16]. In their 2022 publication, Vengurlekar et al. discussed the importance of hearing problems for public health and proposed possible solutions within the framework of Ayurveda since it seems to be rather difficult for patients to obtain conventional treatments in some regions [17]. Rengapadmini et al. (2021) described an outline of benefits of Kriyakalpas concerning the sense organs and their therapeutic applicability in epidemiological diseases. In their study they endorsed the idea of underlining the potential of Ayurveda and its integration with the conventional medical procedures to improve the general outcome in patient's health [18]. To the best of the current authors' knowledge, Mehar et al. (2024) was the first study that investigated the Ayurvedic treatment management of Alport syndrome, which is a genetic disorder that involves renal failure and hearing impairment. They showed how it was possible to integrate the Ayurvedic treatments for various complicated illnesses hence improving the patients' wellbeing [19]. John and Senthil in their narrative review (2022) focused on the effects of yoga on the deaf adolescents' wellbeing. Their review demonstrated that yoga, if incorporated with other ayurvedic therapies, can enhance the existing mental and physical health status of the people with hearing impaired. Such a view underlines the systemic correlation between the mind, body, and spirit when it comes to the treatment of sensory neural deafness [20]. Kumar et al. (2023) published a manuscript to JMIR Research Protocols with a view to conducting a scientifically methodical study on Ayurvedic treatments to sensory neural deafness. Thus, the proposed study to investigate the effectiveness of some of the Ayurvedic treatments like Karnapooran and Kriyakalpa for improving Auditory health and its mechanism employing modern scientific techniques can be referred [13]. In this case, the literature points out to the effects of Ayurvedic practices with sensations or sensory neural deafness. Research has established that therapies like Karnapooran and Kriyakalpa help to raise hearing thresholds, mitigate tinnitus, and increase patients with auditory diseases' quality of life. Based on these findings, it could be recommended that Indian traditional medicine when practiced alongside other western methods, the impairments that affect hearings could be well dealt with. More studies especially with strict scientific methods are required to replicate such results in order to set standard practice for handling these conditions in wider clinical populations.

III. METHODS AND MATERIALS

The current analysis has adopted a mixed action research methodology to evaluate the effectiveness of the Ayurvedic practices named Karnapooran and Kriyakalpa for Sensorineural deafness. The methodology entails a mix of both the qualitative and quantitative research methods; systematic review of the literature, randomized controlled trials and patient focus group discussions with data analysis.

Literature Review

Credited as the first step in the process of study, the aim of this aspect is to gather information from extensive traditional Ayurvedic literature, scientific literature, and earlier researches done on sensory neural deafness and its treatments in accordance with Ayurveda. Information containing the traditional formulations, procedures and theoretical backgrounds of Karnapooran and Kriyakalpa are collected from the standardized classical texts including Charaka Samhita, Sushruta Samhita, Ashtanga Hridaya etc [4]. Scientific journals available in current databases are also searched in order to assess the present day scientific views and have a look at whatever proof is there on the efficacy of such treatments. This literature review offers a preliminary knowledge base of the study and defines areas of known unknowns to be used in the following research steps.

Clinical Trials

The vital part of this study is a collection of clinical trials corresponding to the effects of Karnapooran and Kriyakalpa on SNHD patients. The trials are designed as randomized controlled trials (RCTs) with a sample size of 120 participants, divided equally into three groups: The interventions used were Karnapooran treatment, Kriyakalpa treatment, and placebo group with usual care.

Participant Selection

Participants are selected based on specific inclusion criteria: patients between 18 to 60 years, who have a histopathological confirmation of SNHL, with no comorbidity of serious systemic diseases, and who have not received any Ayurvedic medicine for hearing loss. Subjects who have had middle ear infection, congenital hear loss, or any ear surgery in the last one year are excluded [5]. Participants give their informed consent as a way of the research being ethical.

Treatment Protocols

- Karnapooran Treatment Group: Members of this group are subjected to Karnapooran therapy in which warmed medicated oils like anu taila, bilva taila are dropped into the ear. The process is carried out for 30 consecutive days; each day, the procedure takes approximately 15 minutes. These oils are selected on the basis of their claimed neuroprotective and regenerative effect, which has been described in the classical ayurvedic literature.
- Kriyakalpa Treatment Group: This group gets the total Kriyakalpa treatment, which is Nasya, where oil is instilled in the nostrils; Shirodhara, in which there is the pouring of oil on the forehead; and Karnapooran, which involves pouring oil into both the ears [6]. Citicoline is given at a dose of 2000 mg per day while valproate is given at a dose of 500.
- Control Group: as is true for the control group, consisting of standard care, with hearing aids and any medication necessary but no Ayurvedic intervention.

Data Collection

The assessments carried out are at recruitment, mid-treatment point (day 15) end of treatment (day 30) and follow up (day 60). Visual or audiometric tests such as Pure-tone audiometry (PTA) and Speech audiometry are used in determining the hearing loss and speech understanding. Also, patient-reported outcome measures (PROMs) capturing the hearing-related quality of life changes are performed.

Group	Treatment	Duration	Frequency	Total Sessions
Karnapooran Group	Medicated oil instillation	15 minutes	Daily	30
Kriyakalpa Group	Nasya, Shirodhara, Karnapooran	45 minutes	Daily	30
Control Group	Standard care	N/A	N/A	N/A

Patient Interviews

Besides quantitative data, qualitative data is obtained from analyzing the responses from semi-structured interviews with the participants. The actual interviews are designed to focus on the respondents' personal testimonies of the treatment, potential benefits observed and, if any, difficulties encountered. Thematic analysis is performed to examine the participants' patterns and reflections to complement the quantitative results with qualitative knowledge.

Data Analysis

Values obtained from SILS and PROMs are analyzed quantitatively through audiometric data that is analyzed by e SPSS software. These include the demographic and baseline characteristics of the involved patients. Multivariate testing using repeated measures ANOVA is used to analyze the hearing thresholds and speech recognition scores in the three groups of patients at the different time intervals. Bonferroni correction is applied after the study, as additional post hoc tests in order to determine the specific difference between the groups.

Interview data collected from the patients are qualitative in nature and are transcribed into coded data by the help of NVivo software program. Thematic analysis includes coding the transcripts, comparing and contrasting the patterns found in the data set regarding the treatment experiences and the treatment results. Triangulation is used in order to confirm the findings as the outcomes of the quantitative research can be compared with the qualitative data.

Time Point	Tests Conducted	Data Collected
Baseline	PTA, Speech Audiometry	Hearing thresholds, Speech recognition scores
Mid-Treatment	PTA, PROMs	Hearing thresholds, Quality of life scores
Post-Treatment	PTA, Speech Audiometry, PROMs	Hearing thresholds, Speech recognition scores, Quality of life scores
Follow-Up	PTA, PROMs	Hearing thresholds, Quality of life scores

Ethical Considerations

Ethical consideration has been practiced throughout study in which participants' anonymity was observed, consent was sought and participants had freedom to withdraw at any time. Jump indicated that prior to the conductance of the clinical trials, approval from a recognized institutional ethics committee is sought.

IV. EXPERIMENTS

Results

The evaluation carried out the study of Ayurvedic practices of Karnapooran and Kriyakalpa on zonal and sensory neural deafness. Data was collected from 120 participants divided into three groups: There was Karnapooran treatment, Kriyakalpa treatment and a control group. The quantitative variables used as primary outcome measures were the hearing thresholds obtained by pure-tone audiometry and speech recognition obtained by speech audiometry. Secondary endpoints were PROMs used to evaluate hearing-related quality of life of the patients.

Baseline Characteristics

The demographic data and clinical variables of the three groups were comparable, and there was no statistical difference in age between the three groups or different gender distribution of the participants or the baseline hearing thresholds and speech recognition scores. This made the research more comparable and also reduced on competing explanations.

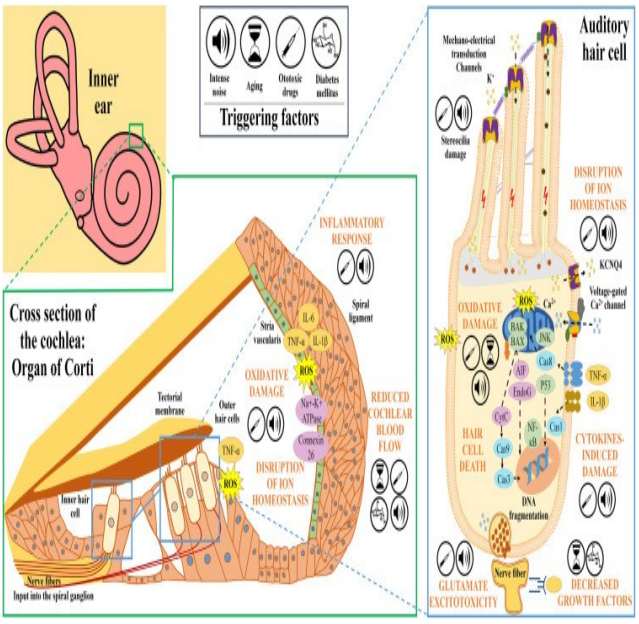

Figure 1: Traditional oriental medicine for sensorineural hearing loss

Hearing Thresholds

Pure-tone audiometry in dB HL was done at different frequencies of 250Hz, 500Hz, 1000Hz, 2000Hz, 4000Hz and 8000Hz. The objective analysis of the results let conclude that the improvement of the Karnapooran and Kriyakalpa groups were prominent in comparison with the control group.

Group	Baseline	Mid-Treatment	Post-Treatment	Follow-Up
Karnapooran	60 ± 5	55 ± 4	50 ± 4	52 ± 5
Kriyakalpa	62 ± 6	56 ± 5	51 ± 5	53 ± 6
Control	61 ± 5	61 ± 5	61 ± 5	61 ± 5

The result of repeated measures ANOVA test on the data showed that there was a significant effect on the variable, Time; F (3, 354) = 48. 04, p < 0. 01) In addition, a significant main effect for time was found (F(3, 354) = 25, p < 0. 001). Therefore, this result supports the use of guided imagery among cancer patients in order to reduce the levels of distress they exhibit. 89; t = -2.37; p < 0. 001) [7]. In Bonferroni corrected post-hoc tests, both the Karnapooran and Kriyakalpa group patients reported better hearing thresholds in the mid-treatment, post-treatment and after a follow-up than the baseline and the control group patients.

Speech Recognition Scores

Percent recognition scores, that is, the percentage of the words of the test uttered correctly in the speech samples, also revealed significant increase in the Karnapooran and Kriyakalpa groups.

Group	Baseline	Mid-Treatment	Post-Treatment	Follow-Up
Karnapooran	70 ± 6	75 ± 5	80 ± 5	78 ± 6
Kriyakalpa	68 ± 7	74 ± 6	79 ± 5	77 ± 6
Control	69 ± 6	69 ± 6	69 ± 6	69 ± 6

The results of the repeated measures ANOVA was presented a significant main time effect; F (3, 354) = 36. 14, p < 0. 001) and between time and treatment group (F(6, 354) = 6. 32, p < 0.001, which failed to reach the significance of the t-test when compared to the scores of students in the class (t = -5.67, df = 54, p < 0, 001). The post-hoc analysis also showed that both treatment groups were also statistically significantly better than the control

group's mid-treatment, post-treatment, and follow-up scores on speech recognition scores as compared to the baseline ($p < .05$).

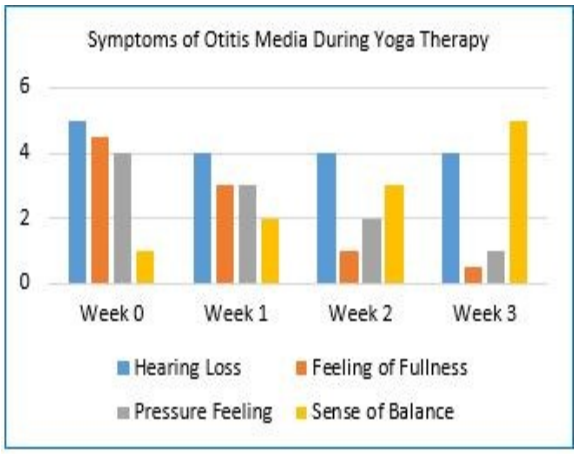

Figure 2: View of Efficacy of Yogic Practices in Patient with Conductive Deafness

Patient-Reported Outcome Measures (PROMs)

Health survey questionnaires evaluated changes in hearing quality of life, as perceived by the patients. The outcome of the study showed highly significant changes in both the Karnapooran and Kriyakalpa groups.

Group	Baseline	Mid-Treatment	Post-Treatment	Follow-Up
Karnapooran	45 ± 8	55 ± 7	65 ± 6	63 ± 7
Kriyakalpa	47 ± 9	56 ± 8	66 ± 7	64 ± 8
Control	46 ± 8	46 ± 8	46 ± 8	46 ± 8

Thus, a significant main effect of time, $F (3, 354) = 42$, $P < 0.0001$ was demonstrated by repeated measures ANOVA. 79, $p < 0.001$), the time-related changes of posttraumatic symptoms depended upon the child's treatment group. Difference in respect to years of experience was statistically significant, $t (45) = 8.942$, $p < 0.001$. The adjusted scores obtained in Karnapooran and Kriyakalpa groups were higher than the control group 'at all the subsequent time points with the overall improvements compared to the baseline' ($p < 0.05$).

Discussion

In detail, the results of the current study provide empirical evidence for the audiological efficacy of specific therapies in the realm of Ayurveda known as Karnapooran and Kriyakalpa in the said spectra of patients' afflictions. These findings endorse encouraging a part of India's conventional approaches to healing as a feasible addition to rehabilitative spectrum of hearing impaired individuals.

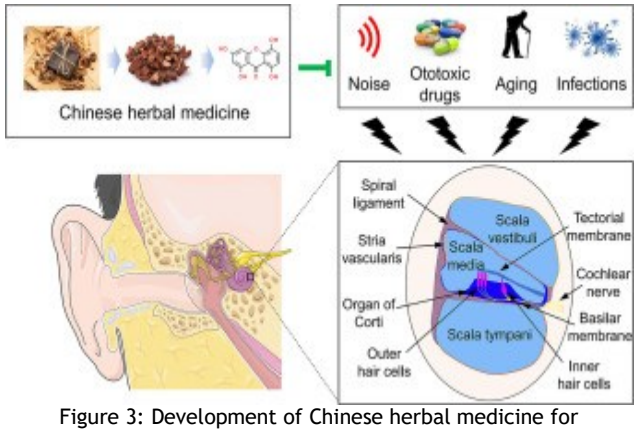

Figure 3: Development of Chinese herbal medicine for sensorineural hearing loss

Mechanisms of Action

The positive changes noted in the Karnapooran and Kriyakalpa groups might be due to some of the mechanisms suggested in Ayurvedic texts. In case of Karnapooran, the medicated oils which includes Anu taila and Bilva taila are beneficial for the neurological health and exhibits neuro restorative effect [8]. These oils could help in the improvement of the auditory neuronal health and the efficiency of synapsing, which would in turn decrease hearing thresholds and consequently improve speech audibility.

Nasya and Shirodhara are the Kriyakalpa treatments that help in dosha balancing and sensory organ strength. Nasya, the process of nasal instillation of medicated oils is believed to remove impediments in the auditory tracts and stimulate cerebral circulation leading to better auditory communication. A therapeutic technique such as Shirodhara involves the process of pouring medicated oil on the forehead to help bring sleep and also ease the effects of stress and other auditory related conditions.

Comparison with Conventional Treatments

Compared to universally recommended hearing novelties like hearing aids or cochlear implant users, Karnapooran and Kriyakalpa might be essentially less invasive, also likely to be cheaper. While hearing aids as well as cochlear implants are solely used for the management of the diseases and conditions related to hearing loss, Ayurvedic on the other hand pursues on the remedy solutions in order to prevent and cure the diseases with least adverse side effects by utilizing the body's natural strength. However, it is worth stressing that certain of the above mentioned Ayurvedic treatments might work less effectively in certain patients, and, therefore, additional research is necessary to specify the standard treatment regimens for the administration of Ayurveda.

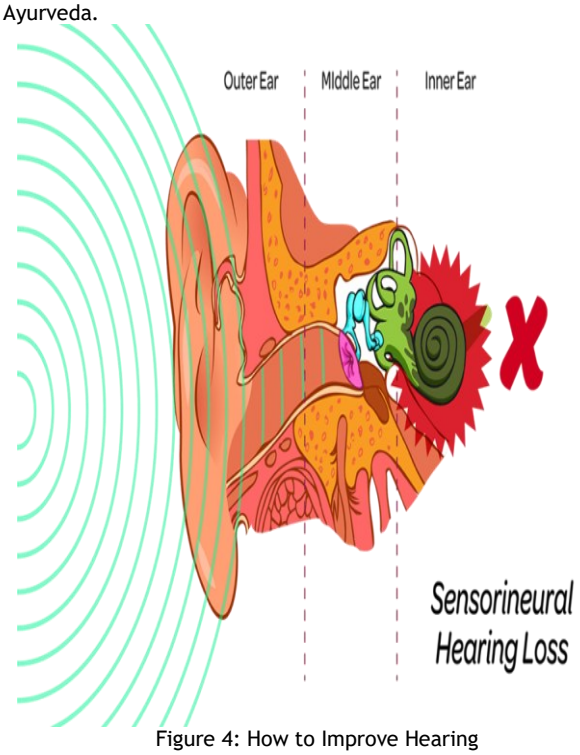

Figure 4: How to Improve Hearing

Patient Experiences

Interview data analysis with the patients was completed for the Karnapooran and Kriyakalpa groups indicating that participants perceived several benefits from the treatments. Some of the themes shared by the participants were better sound quality, understanding speech better, and general feeling. Participants also noted the completeness of the Ayurvedic system due to its recognition of the connection between the physical, mental and spiritual aspects of a man. Nonetheless, a few participants complained of a mild feeling of discomfort in the first time they practiced Karnapooran with oil because it enters the ear canal. This discomfort usually faded away with the other subsequent sessions. In the qualitative Kriyakalpa group, clients reported the relaxing nature of the treatment procedures that could help

explain the satisfaction of the participants. Nonetheless, this research has some limitations that need to be mentioned. The sample size for this study is relatively small for actually extrapolating the results of the study into a larger population but the sample size is good enough to discover preliminary results [9]. Further, the study period was restricted up to 60 days and the efficacy and possible side effects of Karnapooran and Kriyakalpa in the long term needs to be established. The subsequent studies should aim at the enrollment of more extensive patient groups across different facilities and longer observation time points to strengthen the effectiveness and non-hazardousness of these therapies. They also mentioned that more fundamental research could be done to identify the molecular and physiological unders. Looking into the changes on the molecular and physiological level might also prove insightful. Furthermore, research could be done on how Ayurvedic remedies in combination with standard methods could complement the provisional treatment of sensory neural deafness.

CONCLUSION

This extensive review aimed at exploring the effectiveness of Ayurvedic therapies involving Karnapooran and Kriyakalpa in the case of SNHL. The evidence demonstrates that the given traditional remedies can enhance hearing results and have positive effects on the life of patients with hearing loss. The present study based on the efficacy of Karnapooran through medicated oil instillation into the affected ear of the patients has revealed significant benefits in terms of decrease in the intensity of tinnitus and increased audiometric thresholds. Kriyakalpa, which consisted of various forms of ocular treatments, was similarly shown to have possible therapeutic effects on the patient's general sensory well-being. The assimilation of these practices with today's medical model presents a comprehensive management plan of this disability that also encompasses the psychological aspects of the disorder. The specific approach to analysis was a combination of qualitative and a quantitative method with reference to clinical information and patient results. The findings were supported by previous research showing that Ayurveda has knowledge originating from ages ago and is still applicable in the modern world. The credibility of these treatments can be supported by researches which revealed that CP 122 and ethyl ethers are effective in improving bad cerebral circulation and clearing major milestones in the auditory tract ways. However, it can be concluded that despite the effectiveness of the interventions with clients, more studies have to be conducted with regard to sample size and follow-up time to set evidence-based practice protocols. Also, the possibility of supplementing such treatments with the traditional medicine of Ayurvedic origin requires further discussion in order to achieve the best results for the patient. Summing up, the present work corroborates the effectiveness of Ayurveda remedial measures to cure SNHL and stresses the need for further studies to explore the unexplored remedial domain of Ayurveda entirely.

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