CHAPTER-6

DISCUSSION

Discussion:

Aging is a natural phenomenon. The age criteria to define older persons vary across the globe. In India, it is 60 years and above and the absolute number of elder adults will be rising from 90 million in 2011, to 173 million by 2026.

Advancing age leads to many physical and psychiatric disorders. The elderly subjects are prone to be affected by a plethora of communicable diseases, due to diminishing immune capacity, compared to their younger counterparts. But the more significant physical disorders affecting elderly with significant morbidity and mortality include non communicable diseases, cancers, degenerative disorders and psychological illnesses.

Some of the challenges, which the aged have to cope with, include retirement, changes in the family structure, new roles, widowhood, grand parenting, illness, loneliness and death in the family. Even though, caring for the aged has been part of Indian tradition but the situation is fast changing due to many compelling reasons. In a society that was known for the way in which it cared for its elderly, one is seeing a fast rise in the number of old age homes due to rapid urbanization, nuclear family system and growing economic constraints. The elderly people residing in old age homes as a sub-group are rapidly increasing in numbers. They have difficulties much different from the elderly residing in the community. Social issues like being widowed or no one to look after them, make them choose to stay in old age homes. In addition cognitive impairment and physical disabilities also determine the placement of elderly in such homes. The elderly subjects residing in these homes are more likely to be adversely affected by the physical and psychological problems mentioned above.

India was home for origin of Ayurveda, Yoga and Sidha forms of health care. It has also adopted many other complimentary and alternate therapies like, Unani and Homeopathy etc. Now, these form parts of AYUSH. In spite of this heterogeneous nature of therapies available in Indian health care system, Allopathic system is the most popular and widely used form of health care. Elderly people are not an exception.
to this. So the first line of treatment is pharmaceutical drugs. These drugs are often prescribed by multiple practitioners and predominantly targeting the symptoms of the patients without any holistic approach. They are also tend be costly, with significant risk of adverse reactions. Conventional pharmacological drugs invariably lead to dependence and iatrogenic problems etc.

The complimentary and alternate therapies are usually perceived to be the solutions to all the problems existing in the allopathic system of health care. In spite of centuries of history, to date, research to find alternative non-pharmacological ways has been limited and only recently, it is gaining momentum.

The study is an earnest attempt to document the effectiveness of Music therapy in elderly subjects. The study was a randomized controlled design with two comparable treatment groups receiving music therapy and standard care. Majority of the participants belonged to 61 to 70 years of age group with equal proportion of males and females. The number was almost equal in both the study groups and with no statistical significant difference.

The proportion of illiterate population was slightly higher in control group (26% vs 20.6%). Majority of the study participants in both the study groups were educated up to elementary school or and high school. The difference in the proportion of people with different educational status between the study groups was statistically not significant.

Majority of the study participants (67% in experimental group and 62% in control group) had reported that they have no personal income at all, indicating high proportion of dependency among study the participants. But in terms of their income status there was no statistically significant difference between the two study groups.

The proportion of participants reporting current active relationship with the family members was 41.6% and 49 % respectively in the study groups. Even though this proportion is higher in controls but it was not statistically significant.

So overall it can be concluded that both the study groups were comparable with respect to key socio economic variables, including age, gender, educational and income status.

Various lifestyle related factors like exercise, the personal interests and substance abuse were compared between the two study groups. The proportion of
subjects reporting regular walking was slightly higher in experimental group (80.2%) compared to the control group (75%). The proportion of experimental group subjects reporting interest in games and tailoring was 7.9% and 11.9% respectively, where as these proportions were 5% and 19% respectively in the control group. The most common substance abuse reported in both the study groups was Pan chewing (12.9% in the experimental group and 20% in the control group), followed by smoking (9.9% in the experimental group and 8% in the control group). Even though minor differences existed in the lifestyle factors between two study groups, they were not statistically significant. Hence, it can be concluded that the study groups were comparable with respect to the life style factors.

The mean values of base line biophysical parameters were compared between the two study groups, using student t-test. The Mean systolic and diastolic blood pressures were higher and were falling in the range of Stage II hypertension in both the study groups. No statistically significant difference in blood pressure, pulse and respiratory rate was observed between the study groups at Pre test (P value < 0.05).

Atenolol was the most common drug used in both the study groups. Statistically there was no significant difference between the experimental and control groups, with respect to proportion of subjects using various anti hypertensive drugs. The proportion of different drugs use also remained relatively constant from baseline to the end of study period.

The proportion of subjects using twice daily dose of medication was 44.6% in experimental group and 47% in control group.

In control group the proportion of subjects taking atenolol remained same.

In the experimental group, the proportion of subjects taking atenolol reduced from 44.6% at baseline to 32.7% at 1 month after music therapy. This reduction was statistically significant.

Statistically there was a significant difference between the proportion of subjects using twice daily dose in experimental and control group after one month period. It was calculated using chi square test.

Majority (95%) of the participants in both the study groups came under moderate well being category using SWBI score. Only 5% of the participants in each
group were classified to have poor SWBI score. There was no statistically significant difference in baseline level of SWBI score among both the groups.

Blood Pressure:

The mean difference between the experimental and control groups in baseline blood pressure was very minimal (Mean difference 0.60, t value 0.30, P value 0.76).

After 1 month of music therapy, in the experimental group the mean systolic BP was 151.85mmHg whereas in the control group it remained high at 160.40mmHg (Mean difference 8.55, t value 4.41, P value < 0.001). This difference was large and it was statistically significant.

In the experimental group, mean SBP was 161.6mmHg in baseline and after 1 month it was reduced to 151.85mmHg. The difference between baseline and 1st month is 9.65mmHg. This difference was statistically significant.

In the control group, mean SBP was 161.00mmHg in baseline and after 1 month it was 160.40mmHg. The difference between baseline and 1st month was 0.60mmHg. This difference was not statistically significant.

Both these differences were analyzed by using Student paired-test.

The baseline DBP was 100.10mmHg in the experimental group, whereas in the control group it is 98.60mmHg. So the difference between experimental and control group is 1.50mmHg. The difference is small and not statistically significant.

After one month of music therapy, the mean DBP in the experimental group was 95.70mmHg. After one month, the mean DBP in the control group was 98.22mmHg. There is a mean difference of 2.52mmHg between the two groups after one month and this is large and statistically significant (P value= 0.05).

In the experimental group, the mean DBP was 100.1mmHg at baseline and after 1 month it was 95.70mmHg. The difference between the baseline and 1st month was 5.4mmHg. This difference was statistically significant (P value < 0.01) which was analyzed using Student paired-test.

In control group, the mean DBP was 98.60mmHg in baseline and after 1 month it was 98.22mmHg. The difference between baseline and 1st month was 0.38mmHg. This difference was very minimal and was statistically not significant (P value 0.27). This was analyzed using Student paired-test.
Listening to Indian classical music for about 22 minutes significantly reduced the systolic and diastolic blood pressures, pulse rate and respiratory rate of the experimental subjects. The findings are in concurrence with the results of similar kind of studies done by other research scholars around the world.

Hence, music therapy may have a potential benefit in lowering blood pressure, preventing the cardiovascular diseases and psychological problems in the elderly hypertensive patients.

Pulse Rate:

In the present study, at baseline, the pulse rate in experimental group was 84.34 beats per minute, whereas in the control group it was 84.40 beats per minute. So the difference between the experimental and control group was 0.06 beats per minute. The difference was small and not statistically significant.

After 1 month of music therapy, the difference in the pulse rate between the experimental and control groups was 1.33 beats per minute. This is statistically significant.

In experimental group the pulse rate was 84.34 beats per minute, which was reduced to 82.80 beats per minute after 1 month of music therapy. The mean difference of 1.54 beats per minute is statistically significant. Where as in the control group, the difference between baseline and 1st month was only 0.27 beats per minute, which is statistically not significant.

Respiratory Rate:

The baseline mean respiratory rate in the experimental group was 21.78 cycles per minute, whereas in the control group it was 21.98 breaths per minute. The mean difference in respiratory rate at baseline was 0.20 breaths per minute. This is small and not statistically significant.

After 1 month of music therapy, the mean respiratory rate in the experimental group was 20.90 breaths per minute and in the control group it was 21.83 breaths per minute, with mean difference of 0.93 breaths per minute. This is large and statistically significant.

In experimental group, the mean respiratory rate was 21.78 breaths per minute at baseline and after 1 month it was reduced to 20.90 breaths per minute. The mean
difference between baseline and 1st month respiratory was 0.88 breaths per minute and was statistically significant. In the control group, the mean difference between baseline and 1st month respiratory rate was only 0.15 breaths per minute. This was statistically not significant.

No statistically significant difference was observed among various components of subjective well being inventory score between the two study groups at baseline.

Subjective well being inventory (SWBI) score:

The mean subjective well being inventory score was 52.82 in the experimental group and it was 46.38 in the control group after one month, with a mean difference of 6.44, which was statistically significant.

Statistically significant difference was also observed in many of the sub components of the subjective well being inventory scale.

Within the experimental group, the mean subjective inventory scale score was 45.41 at baseline and it increased by 7.41 points to 52.82 after 1st month of music therapy. This difference in the mean score was statistically significant.

Similar statistical significance was observed between various sub components of the subjective well being inventory score between baseline and 1st month values.

No statistically significant difference was observed in subjective well being inventory score, between the baseline and 1st month values in the control group.

In Pre test, there is no statistically significant difference in the subjective well being inventory score between the experimental and control groups.

After 1 month, there is statistically significant difference in the subjective well being score between the experimental and control groups.

In all the parameters, the gain score was higher in the experimental group.

Highest % gain was observed in the subjective well being inventory score, followed by the systolic and diastolic blood pressures.

Lacunae of the above Subjective Study Design:

The above biophysical and psychological parameters are subjective in nature and are subject to bias, manipulation, misrepresentation and misconception etc.
Hence, there is an urgent need to find a reliable and verifiable objective study tool to counter the criticism of subjective study tools and also authenticate the results of the subjective study tools.

This was achieved by adding Electroencephalogram (EEG) and doing Power Spectrum Analysis of EEG.

Power Spectrum Analysis of EEGs:

While comparing the Pre test mean alpha, beta and theta Power of EEG of 2 minutes from Occipital region of the brain (O1) between the study groups, we notice that the mean difference in the mean alpha Power is 63.44, in the mean beta power the difference is 18.56 and in theta power the difference is 0.67 (Table 42).

No statistically significant difference is seen.

While comparing the Post test mean alpha, beta and theta power of EEG of 2 minutes from Occipital region of the brain (O1) between the study groups, we notice that the mean difference in the mean alpha power is 146.52, in the mean beta power the difference is 82.24 and the theta power the difference is 11.27 (Table43).

All the values in the Post test mean power scores were statistically significant.

While comparing the Pre test mean alpha, beta and theta Power of EEG of 22 minutes from Occipital region of the brain (O1) between the study groups, we notice that the mean difference in the mean alpha Power is 28.22, in the mean beta power the difference is 1.02 and in theta power the difference is 2.63 (Table 44).

No statistically significant difference is seen.

While comparing the Post test mean alpha, beta and theta power of EEG of 22 minutes from Occipital region of the brain (O1) between the study groups, we notice that the mean difference in the mean alpha power is 204.44, in the mean beta power the difference is 4.00 and the theta power the difference is 47.68 (Table45).

All the values in the Post test mean power scores were statistically significant.

While comparing the Pre test mean alpha, beta and theta Power of EEG of 2 minutes from Occipital region of the brain (O2) between the study groups, we notice that the mean difference in the mean alpha Power is 22.80, in the mean beta power the difference is 10.10 and in theta power the difference is 18.54 (Table 46).
No statistically significant difference is seen.

While comparing the Post test mean alpha, beta and theta power of EEG of 2 minutes from Occipital region of the brain (O2) between the study groups, we notice that the mean difference in the mean alpha power is 120.20, in the mean beta power the difference is 10.40 and the theta power the difference is 69.12 (Table 47).

All the values in the Post test mean power scores were statistically significant.

While comparing the Pre test mean alpha, beta and theta Power of EEG of 22 minutes from Occipital region of the brain (O2) between the study groups, we notice that the mean difference in the mean alpha Power is 4.002, in the mean beta power the difference is 3.60 and in theta power the difference is 0.28 (Table 48).

No statistically significant difference is seen.

While comparing the Post test mean alpha, beta and theta power of EEG of 22 minutes from Occipital region of the brain (O2) between the study groups, we notice that the mean difference in the mean alpha power is 59.64, in the mean beta power the difference is 30.04 and the theta power the difference is 2.21 (Table 49).

All the values in the Post test mean power scores were statistically significant.

While comparing the Pre test mean alpha, beta and theta Power of EEG of 22 minutes from Temporal region of the brain (T3) between the study groups, we notice that the mean difference in the mean alpha Power is 68.00, in the mean beta power the difference is 43.64 and in theta power the difference is 6.58 (Table 52).
No statistically significant difference is seen.

While comparing the Post test mean alpha, beta and theta power of EEG of 22 minutes from Temporal region of the brain (T3) between the study groups, we notice that the mean difference in the mean alpha power is 68.00, in the mean beta power the difference is 43.64 and the theta power the difference is 6.58 (Table 53).

All the values in the Post test mean power scores were statistically significant.

While comparing the Pre test mean alpha, beta and theta Power of EEG of 2 minutes from Temporal region of the brain (T4) between the study groups, we notice that the mean difference in the mean alpha Power is 3.60, in the mean beta power the difference is 1.38 and in theta power the difference is 0.40 (Table 54).

No statistically significant difference is seen.

While comparing the Post test mean alpha, beta and theta power of EEG of 2 minutes from Temporal region of the brain (T4) between the study groups, we notice that the mean difference in the mean alpha power is 51.40, in the mean beta power the difference is 43.37 and the theta power the difference is 29.87 (Table 55).

All the values in the Post test mean power scores were statistically significant.

While comparing the Pre test mean alpha, beta and theta Power of EEG of 22 minutes from Temporal region of the brain (T4) between the study groups, we notice that the mean difference in the mean alpha Power is 0.92, in the mean beta power the difference is 22.80 and in theta power the difference is 1.00 (Table 56).

No statistically significant difference is seen.

While comparing the Post test mean alpha, beta and theta power of EEG of 22 minutes from Temporal region of the brain (T4) between the study groups, we notice that the mean difference in the mean alpha power is 29.44, in the mean beta power the difference is 74.28 and the theta power the difference is 8.76 (Table 57).

All the values in the Post test mean power scores were statistically significant.

While comparing the Pre test mean alpha, beta and theta Power of EEG of 2 minutes from Temporal region of the brain (T5) between the study groups, we notice that the mean difference in the mean alpha Power is 1.40, in the mean beta power the difference is 3.68 and in theta power the difference is 0.74 (Table 58).
No statistically significant difference is seen.

While comparing the Post test mean alpha, beta and theta power of EEG of 2 minutes from Temporal region of the brain (T5) between the study groups, we notice that the mean difference in the mean alpha power is 75.36, in the mean beta power the difference is 49.84 and the theta power the difference is 8.76 (Table 59).

All the values in the Post test mean power scores were statistically significant.

While comparing the Pre test mean alpha, beta and theta Power of EEG of 22 minutes from Temporal region of the brain (T5) between the study groups, we notice that the mean difference in the mean alpha Power is 17.20, in the mean beta power the difference is 2.84 and in theta power the difference is 0.12 (Table 60).

No statistically significant difference is seen.

While comparing the Post test mean alpha, beta and theta power of EEG of 22 minutes from Temporal region of the brain (T5) between the study groups, we notice that the mean difference in the mean alpha Power is 79.44, in the mean beta power the difference is 67.68 and the theta power the difference is 11.53 (Table 61).

All the values in the Post test mean power scores were statistically significant.

While comparing the Pre test mean alpha, beta and theta Power of EEG of 2 minutes from Temporal region of the brain (T6) between the study groups, we notice that the mean difference in the mean alpha Power is 13.44, in the mean beta power the difference is 1.56 and in theta power the difference is 0.11 (Table 62).

No statistically significant difference is seen.

While comparing the Post test mean alpha, beta and theta power of EEG of 2 minutes from Temporal region of the brain (T6) between the study groups, we notice that the mean difference in the mean alpha power is 128.84, in the mean beta power the difference is 69.98 and the theta power the difference is 15.06 (Table 63).

All the values in the Post test mean power scores were statistically significant.

While comparing the Pre test mean alpha, beta and theta Power of EEG of 22 minutes from Temporal region of the brain (T6) between the study groups, we notice that the mean difference in the mean alpha Power is 14.60, in the mean beta power the difference is 7.00 and in theta power the difference is 0.78 (Table 64).
No statistically significant difference is seen.

While comparing the Post test mean alpha, beta and theta power of EEG of 22 minutes from Temporal region of the brain (T6) between the study groups, we notice that the mean difference in the mean alpha power is 140.44, in the mean beta power the difference is 73.33 and the theta power the difference is 14.62 (Table 65).

All the values in the Post test mean power scores were statistically significant.

Based on the results of Power Spectrum Analysis of EEG leads, O1, O2, T3, T4, T5 and T6, we notice much better changes in T5 and T6 leads of EEG.

Hence, the EEGs taken from temporal region of the brain (T6) were analysed and presented in graphic forms.

In the control group, at Pre test baseline level, we notice that the mean alpha power score is 53%, mean beta power score is 3.2% and mean theta power score is 36%. The power score was calculated for EEG taken for 2 minutes.

In the control group, after 22 minutes, we notice that the mean alpha power score is 58%, the mean beta power is 2.2% and mean theta power score is 36%.

There is an increase of 5% in the mean alpha power score and reduction of 1% in the mean beta power score. There is no change in the mean theta power score.

This clearly indicates that in the control group we do not notice statistically significant change in the EEG power score.

In the experimental group, we notice that the Pre test EEG for 2 minutes shows that the mean alpha power score is 49%, the mean beta power score is 9.2% and the mean theta power score is 36%.

In the experimental group, after listening to the music for 22 minutes, the mean alpha power score increased to 78%, the mean beta power score reduced to 0.95% and the mean theta power score reduced to 18%.

There was a significant difference in the Post test EEG changes between the study groups.

From the results it can be inferred that the Post test changes were higher in the experimental group after the music therapy.
Hence, the selected instrumental music therapy based on Raga Malkauns has produced the desired results in the EEG in the experimental group.

The study results also that show while comparing the 2 minutes mean power score, the mean beta power score was reduced by 8.85% and the mean alpha power score increased by 29%.

The study results clearly suggest that the played music had reduced the stress and anxiety in the experimental subjects.

“D. K. Aruldas. et. al. in 2011 study titled. a review on influence of music on brain activity using signal processing and imaging system, have evaluated the scaling in the EEG in three groups of subjects; no music, listening to classical music, and listening to rock music by DFA algorithm method. In this review, various techniques used to study the effect of music on brain function were discussed. Effect of music on brain function was studied using EEG, evoked potential and f-MRI.”

“While listening to music, the variations in the brain activity were determined and results were compared between musicians and non-musicians. Most of the studies showed that the brain activity and ability improved by classical music and decreased by rock music. In musicians, the left hemisphere of brain region was dominant and the right hemispheric dominance in non musicians was observed while listening to music. When the brain processes music, the frontal EEG activity is increased. Some of the results obtained failed to clarify the effects of music on learning. Hence, they advised that these issues should be addressed in the future research”.

“This study puts forward that specially designed instrumental music on Sitar based on ancient India Raga Malkauns can be used as an effective relaxation and stress management tool”.

“In most of the software industries, due to cognitive workload (stress) the employees quit their job. This music can used to relieve stress among employees while performing cognitive tasks”.

“Music can be used to cure insomnia, hypertension, etc.”

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The role of chance was addressed properly by the study.

Sample size calculation was done prior to the beginning of the study to minimize the role of chance. Non participation or dropout rates were minimal in the study. The study had good statistical power at the time of analysis. The magnitude of chance was clearly quantified in the analysis by using appropriate statistical test and presenting the P-values. The 95% CI of all the parameters were also presented. The role of confounding was assessed by multivariate analysis.