

Effects of Calisthenics on Sleep Quality among Institutionalized Elderly

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Abstract: *Old age is the final stage of life and is considered as a despised period. Population of 60 years and over in world is expected to increase from 605 million to 2 billion in 2050 (WHO) Population Reference Bureau predicts an increase in the Indian elderly population from 8% in 2010 to 19 % in 2050. This study is conducted to determine the effect of calisthenics on sleep quality among institutionalized elderly. Research approach was quantitative-evaluative approach and adopted quasi experimental pre-test post-test control group design. The samples included were 29 in experimental and control group selected from 2 old age homes of Udupi and South Canara Districts of Karnataka. Calisthenics was provided for the experimental group for 30 days under supervision and 15 days without supervision. Sleep quality was assessed before intervention and 5th, 30th and 45th day of intervention and control group did not receive any intervention. Majority of subjects had poor sleep quality (100% in experimental and 81.8% in control group). RMANOVA for sleep quality scores was statistically significant in the experimental group (F ratio: 61.967, p<0.05).The study concluded that calisthenics was effective in improving sleep quality among institutionalised elderly.*

Keywords: *calisthenics, institutionalized elderly, RMANOVA, sleep quality.*

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I. Background Of The Study

Old age is the final stage of life and is considered as an adverse and despised period. Statistics shows a rapid increase in the elderly population both globally and nationally. The number of people aged 60 years and over in world is expected to increase from 605 million to 2 billion in 2050 (WHO, 2012). Population Reference Bureau predicts an increase in the Indian elderly population from 8% in 2010 to 19 % in 2050.

The reviews identified that sleep quality as a major health problem among elderly. Martin J, Fiorentino L, Jouldjian S, Josephson KR, Alessi CA conducted a prospective, observational cohort study to describe the sleep patterns among the elderly residents of assisted living facilities at Los Angeles. Baseline data was taken for 3 days and nights of wrist actigraphy and a battery of self-report questionnaires. Second phase assessments were conducted in 3 and 6 months from the date of enrolment using PSQI, actigraph, Berlin Sleep Apnoea Questionnaire, Restless Leg Syndrome (RLS) scale and Geriatric Depression scale. The results showed that sixty-five (65%) participants had poor sleep quality. It was recommended in the study to adapt more interventions to improve sleep quality. An epidemiologic study conducted by Foley DJ, Monjan AA, Brown SL, Simonsick EM, Wallace RB, Blazer DG in three different communities (n=9,000) found that only less than 20% of elderly had good sleep quality. Similarly a survey was done by Suri JC, Sen MK, Ojha UC, Tulsi A (n=1240) in Delhi to assess the prevalence of sleep disorders among elderly and the results showed that 10.3% of subjects had sleeping disorders and higher was in females (10.8%).

Susan Koch BA, Haesler E, Tiziani A, Wilson J conducted a systematic review to find the effectiveness of sleep management strategies for residents of aged care facilities. The reviews provided the results that sleep quality was promoted by physical activity

So to overcome the health problems among elderly, interventions should be planned by the care givers to improve their quality of life and create a positive well-being. This study has aimed to implement calisthenics which contributes to the same, but an area which is been explored minimum. Hence the researcher intended to determine the effect of calisthenics on sleep quality of old age people thereby promoting a healthy living and to add life to years.

II. Research Methodology

This quantitative study adopted an evaluative approach to identify the effectiveness of calisthenics on sleep quality of elderly residing in geriatric homes and the design used was quasi experimental pretest-posttest control group design. The institutionalized elderly of Karnataka form the study population and the elderly

residing in the geriatric homes of Udupi and South Canara District who were between the age group of 60 and 80 years, ambulatory without assistance, could see and could read and write in Kannada language.

The estimated sample size was 16 in each group from a standard deviation of 7 and clinical significant difference of 5; however it was decided to select 25 in each group on the basis of 20% assumed attrition. The sample size was 29 in experimental group and 29 in control group. Administrative permissions were obtained from the old age homes and informed consent from all participants. Ethical clearance was obtained from The Institutional Ethics Committee, Kasturba hospital, Manipal.

The tools used to collect the data were Background Proforma, and Pittsburgh sleep quality index. In background proforma a semi structured interview schedule was developed by the investigator. It included two sections namely Section A: Demographic proforma which had 9 items such as age, gender, education, previous occupation, marital status, type of family, number of children, number of years of institutionalization and Section B: Personal history which had 7 items such as financial support, type of admission into the geriatric home, presence of chronic illness, treatment regimen of chronic illness and reason for admission into the geriatric home. PSQI is a standardized tool with items on duration of sleep, sleep disturbance, and sleep latency, day dysfunction due to sleepiness, sleep efficiency, overall sleep quality, and the need for medications to sleep. The minimum score for each item was 0 and maximum score was 3. The Interpretation of PSQI was, total score ≤ 5 was associated with good sleep quality and total score > 5 was associated with poor sleep quality. The reliability of the tool was tested by test retest method among 20 inmates of Ozanam Old Age Home, Kallianpur and $r = 0.731$.

Calisthenics: The researcher underwent training in calisthenics from expert of Physiotherapy. Calisthenics programme included seven exercises like slow toe taps, up on toes, mini squats, walking on the spot, alternate leg out and in, alternate leg behind, and sit to stand and was administered for 5 days per week for duration of 50 minutes in group for 30 days under supervision of researcher and 15 days without supervision of researcher. An attendance sheet was maintained during the supervised sessions. The exercise programme was validated by three experts and calisthenics was pretested among five institutionalised elderly. The intervention was feasible and no modifications were done. Pilot study was conducted among 20 sample and no changes were made in the tool or in the design of the study.

Procedure: Tool 1 and 2 was administered among the selected participants. The intervention, calisthenics was provided in group for the experimental group for 30 days for a time period of 50 minutes for 5 days in a week between 10 am and 12 pm. It was provided for 4 weeks under supervision of the researcher and the participants were instructed to continue up to 45th day in the similar manner. An attendance sheet was maintained for each supervised session. Post-test was done using the tools 1 and 2 on 6th day, 30th day and 45th day. The control group was taught calisthenics on one day after the 45th day post-test.

III. Results

The data were analysed using both Descriptive and inferential using SPSS 16. Frequency and percentage distribution, mean and standard deviation were used to describe the sample characteristics. Inferential statistics; RMANOVA was used to test the effectiveness of intervention within and between groups.

Sample characteristics

Majority of the sample were in the age group of 76-80 years (44.8 % in experimental and 58.6% in control group) and considering the gender in both groups females comprised the highest percentage (75.9 % in experimental and 62.1% in control group). Majority of samples were married (69 % in experimental and 58.6% in control group) and most were widow/widower (44.8 % in experimental and 31.0% in control group) and has 1-3 children (37.9% in experimental and 13.8 % in control group). Majority belongs to nuclear family (55.2 % in experimental and 51.7% in control group) and got admission to the old age home through payment (96.6 % in experimental and 82.8% in control group). Majority had high school education (58.6 % in experimental and 62.1% in control group) and duration of institutionalization up to one year (69 % in experimental) and 2-5 years (34.5% in control group). Majority of the elderly are not getting any old age pension benefits or widow pension benefits (72.4 % in experimental and 72.4% in control group) (Table 1).

Table 1: Frequency and percentage distribution of demographic variables in experimental and control group

Variables	Experimental group n=29		Control group n=29	
	Frequency	Percentage	Frequency	Percentage
Age in years				
60-65	4	13.8	2	6.9
66-70	4	13.8	6	20.7
71-75	8	27.6	4	13.8
76-80	13	44.8	17	58.6
Gender				

Female	22	75.9	18	62.1
Male	7	24.1	11	37.9
Marital status				
Married	20	69	17	58.6
Single	9	31	12	41.4
Divorced	0	0	1	3
Separated	5	17.2	5	15.2
widow/widower	13	44.8	9	31.0
Type of family				
Extended	1	3.4	0	0.0
Joint	12	41.4	14	48.3
Nuclear	16	55.2	15	51.7
Number of children				
Unmarried	9	31	12	41.4
1-3	11	37.9	4	13.8
4-6	5	17.2	5	17.2
None	4	13.8	8	27.6
Number of years of institutionalization				
0-12 months	20	69	10	34.5
2-5 years	7	24.1	10	34.5
6-10 years	2	6.9	5	17.2
>10	0	0	4	12.1
Education status				
Primary	9	31	10	34.5
High school	17	58.6	18	62.1
Degree	2	6.9	1	3.4
Beneficiary of pension				
Yes	8	27.6	8	27.6
No	21	72.4	21	72.4
Type of admission				
Free admission	1	3.4	5	17.2
Admission on payment	28	96.6	24	82.8

1. Health history of the samples

Most of the participants were taking regular treatment for one or more diseases (82.8 % in experimental and 69.0% in control group) and all of them were taking regular medications for the diseases (100% in experimental and control group). Most of the participants were having hypertension (55.1% in experimental group and 48.1% in control group) and diabetes mellitus (55.1% in experimental group and 21.0% in control group) (Table 2).

Table 2: Frequency and percentage distribution of health history in experimental and control group

Variables	Experimental group n=29		Control group n=29	
	Frequency	Percentage	Frequency	Percentage
History of present illness				
Yes	24	82.8	20	69.0
No	5	17.2	9	31.0
On medications for illness				
Yes	24	100	20	100
No	0	0	0	0
Diseases on regular treatment				
Hypertension	6	20.7	5	17.2
Diabetes mellitus	4	13.8	4	13.8
Hypertension and diabetes mellitus	9	31	5	17.2
Hypertension and asthma	0	0	1	3.4
Hypertension and joint pain	0	0	3	10.3
Weakness	0	0	1	3.4
Asthma	0	0	1	3.4
Diabetes mellitus and kidney problem	2	6.9	0	0
Hypertension, diabetes mellitus, and thyroid	1	3.4	0	0
Joint pain	2	6.9	0	0

2. Sleep quality among experimental and control group

The sleep quality among elderly was assessed using PSQI. According to the score, the sleep quality was categorized into good sleep quality and poor sleep quality.

n= (29+29) =58

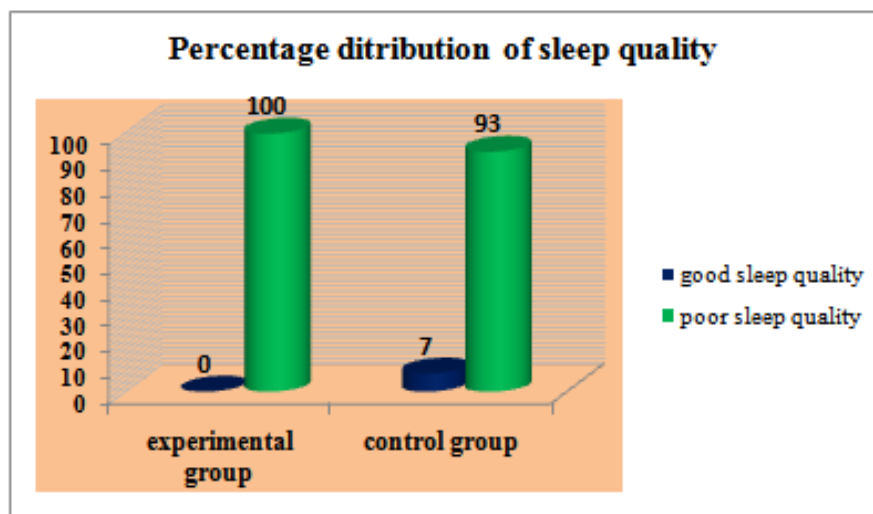


Fig 4: Bar diagram showing percentage distribution of sleep quality among experimental and control group

The data presented in Figure 4 shows that majority of subjects had poor sleep quality, i.e., 29 (100%) in experimental and 27 (93%) in control group.

Effectiveness of calisthenics on sleep quality among institutionalized elderly

RMANOVA for sleep quality scores on PSQI was statistically significant in the experimental group and an increase in the mean sleep quality score during the calisthenics period was found (p<0.05). Thus it can be concluded that calisthenics was effective in improving the sleep quality among institutionalized elderly. (Table 3, Figure 2)

Table 3: Mean and Standard deviation of sleep quality score on PSQI
N= (29+29) =58

PSQI scores	O1		O2		O3		O4	
	Mean	±S.D	Mean	±S.D	Mean	±S.D	Mean	±S.D
Experimental group	11.48	2.760	11.03	2.706	8.00	2.188	7.83	2.037
Control group	10.14	3.049	10.83	3.328	11.10	3.405	11.90	3.028
	Test within the groups				Test between the groups			
F value	3.837				61.967			
df value	2,1.592				1,1			
P value	0.034*				0.001*			

*P value<0.05

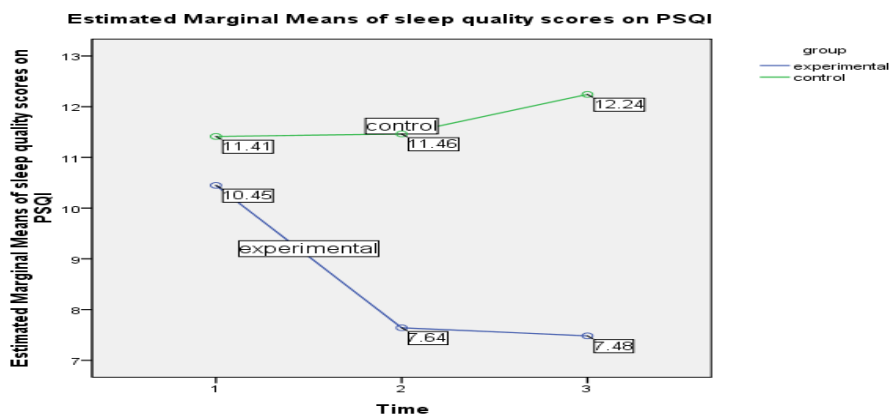


Fig 8: Profile plot showing RMANOVA for sleep quality scores for PSQI

IV. Discussion

Effect of calisthenics on sleep quality of institutionalized elderly

In the present study there was a statistically significant difference in the mean sleep quality scores between experimental and control group and findings concluded that calisthenics was effective in improving the sleep quality of institutionalized elderly.

The findings of present study was supported by a randomized controlled trial by Reid KJ, Baron KG, Lu B, Naylor E, Wolfe L, Zee PC. The results showed a significant increase in the sleep quality among the exercise group ($p < .0001$) and concluded that aerobic exercise along with sleep hygiene education was effective for sleep disorders among the elderly.

Similarly a study done by Tanaka H et al showed that exercise had a positive effect on sleep quality as the sleep efficiency had increased significantly ($p < 0.05$) which supports the present study findings.

The findings of the present study contradict the results of a controlled clinical trial conducted by Ouslander JC, Connell BR, Bliwise DL, Endeshaw Y, Griffiths P, Schnelle JF which showed that there were no significant changes in the sleep quality in the immediate-intervention phase of exercise intervention.

V. Conclusions

The following conclusions can be drawn on the basis of the findings of the present study:

1. Majority of institutionalized elderly had poor sleep quality
2. Calisthenics was effective in improving sleep quality among institutionalized elderly

Limitations of the study

1. Purposive sampling was done to select the setting. This limits the generalization of the study
2. Study samples are restricted to two geriatric homes, hence the generalization is limited.
3. As the researcher had participated during the intervention along with the subjects, so observation of each subject individually was not possible.

Recommendations

1. The study can be replicated by increasing the period of the intervention to evaluate the long term effectiveness.
2. A comparative study can be done to compare the effect of calisthenics and any other interventions like music, yoga.

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