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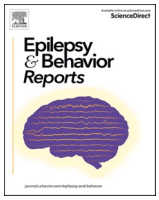

Socio economic factors and adherence to home based exercise in people with epilepsy

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ABSTRACT

Exercise is a well-established component in the management of chronic illness both as a primary prevention and secondary intervention. The assumption that in otherwise healthy individuals, higher socioeconomic status (SES) is positively associated with physical activity (PA) has been debated. We report the influence of SES on adherence to home-based exercise program in people with epilepsy (PWE) from a developing country. Participants' response to self-reported Social Needs Screening Tool of the American Academy of Family Physicians was collected. The current study is a secondary follow-up and post-hoc analysis of data from patients we have previous published. The average age of the study population was 26.93 ± 10.20 years with 57.8 % men. Among the 116 study participants, 31 (26.72 %) were adherent to the exercise program. Unemployment (14.1 % vs. 0.0 %; $p = 0.034$) was higher, fewer people had least high school education (76.6 % vs 93.5 %; $p = 0.050$) in PWE who did not adhere to exercise program. A significantly higher number of PWE who were not adherent to exercise reported that their family members or anyone else never physically hurt them (97.6 % vs 80.6 %; $p = 0.05$), never threaten (94.1 % vs 74.2 %; $p = 0.007$) and/or never scream at them (90.6 % vs 74.2 %; $p = 0.011$). In PWE education and employment are associated with adherence to home-based exercise programs. The role of family support and personal safety in adherence to exercise should be evaluated in detail.

1. Introduction

Self-management in people with epilepsy (PWE) should empower them to manage and monitor their health [1,2] and not just epilepsy. Exercise is well-established component in the management of chronic illness both as a primary prevention and for secondary intervention [3]. Importantly, long-term adherence to exercise programs helps to maintain lasting benefits [4]. Although electronic/smart devices (accelerometers, pedometers, watches) are encouraging tools to assess adherence [5], they often do not capture tailor-made prescribed exercises [6] and may not be economically viable for all PWE.

In PWE, physical activity (PA) has been shown to improve general well-being, mood/behavior and cardiovascular health, and thereby reduce comorbidities like obesity commonly observed in PWE [7]. Hafele et al [8] and Volpato et al [9] reported lower seizure frequency and better quality of life (QOL) in PWE with higher physical activity and aerobic capacity. A recent study on participation of youth in activity and sports by Tandon et al [10] reported the major barriers for otherwise healthy youth with lower socioeconomic status (SES) are affordability, transportation and not feeling welcomed to participate. The consistency of these SES barriers in PWE is not widely investigated. Additionally, in otherwise healthy individuals, the assumption that higher SES is positively associated with physical activity (PA) has been debated [11].

Limitations to measuring activity and exercise, in any study population include component of PA under scrutiny – for example review of literature concluded that assumed positive relationship between SES and PA is mainly a relationship between Leisure Time Physical Activity and not overall PA. Therefore, Stalsberg and Pedersen [12], when evaluating for adherence to PA, suggested that prescribed exercise programs with components – frequency, intensity, duration and type of activity may provide a consistent picture. Furthermore, majority of research on PA and health could be biased and representative of developed countries only. Palma and Assis [11] further emphasize that such research is unrepresentative and less relevant for developing and under-developed countries. In an attempt to nullify the above confounding factors of adherence to exercise, especially in PWE, in the current study, we evaluate the influence of SES on adherence to prescribed, home-based exercises in PWE from a developing country.

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2. Material & methods

2.1. Data collection

The current study is a secondary follow-up and post-hoc analysis of data from patients of our previously published work on adherence to a six-week, tailor-made home-based exercise program in PWE, which was completed in December 2020 [13], where adherence to prescribed exercises was based on the response to first question on the Exercise adherence rating scale (EARS)[13], with a yes or no response to the question "I do my exercises as often as recommended". For understanding the implications of SES, the participants were followed up during their follow-up visit to the out-patient epilepsy clinic of the study center at Krishna Institute of Medical Sciences, a tertiary care referral center in Secunderabad, South-India between September 2023 and March 2024. Inclusion criterion of the study was PWE aged 18; where as PWE with any reason (musculoskeletal, psychological) who could not exercise were excluded. None of the PWE from the previous study [13] were lost for follow-up. The participants' response to self-reported Social Needs Screening Tool of the American Academy of Family Physicians was collected [14]. Non-medical health care counselor blinded to the current study helped the participants in case of a doubt or if the participants were not sufficiently educated. Other data collected are details about demographics, employment, number of ASMs, expenses incurred every month on ASMs. The study was approved by institutional committee(s) Ref. No: CTRI/2014/10/005125. Informed consent was obtained before administering the self-reported questionnaire.

2.2. Statistical analyses

After confirming homogeneity of data, all categorical variables are reported as frequency and percentages; whereas continuous variables are reported as mean ± standard deviation. The study population was divided into two groups – those who adhered to exercise prescription and those who did not. Univariate comparison between groups for categorical and continuous variables was done using Chi-square test and independent *t*-test respectively. A p-value ≤ 0.05 was considered statistically significant. Statistical analyses were done using Statistical Package for Social Sciences (SPSS), version 21.0; IBM Computers, New York, USA.

3. Results

The average age of the study population was 26.93 ± 10.20 (18–58) years with 57.8 % men. Among the 116 study participants, 26.7 % were adherent to the exercise program. There were no significant differences between the groups for age (27.26 ± 10.26 vs. 26.03 ± 10.15 years; p = 0.569), men (58.8 % vs 54.8 %; p = 0.832) number of anti-seizure medications (ASM) (2.12 ± 1.02 vs. 1.87 ± 0.90; p = 0.234) and expenditure on ASMs per month (41.60 ± 37.27 vs 43.04 ± 40.46 US dollars; p = 0.857).

On comparison between the groups for responses on social needs screening tools, Table 1, there was no significant difference between groups for marital status, while unemployment (14.1 % vs. 0.0 %; p = 0.034) was higher, fewer people had at least high school education (76.6 % vs 93.5 %; p = 0.050) in PWE who did not adhere to exercise program. On the contrary, more number of PWE who adhered to exercise reported difficulty to pay utility bills in the past 12 months (1.2 % vs 12.9 %; p = 0.018). The frequency distribution of four personal safety questions is summarized in Fig. 1. A significantly more number of PWE who were not adherent to exercise reported that their family members or anyone else never physically hurt them (97.6 % vs 80.6 %; p = 0.05), never threaten (94.1 % vs 74.2 %; p = 0.007) and/or never scream at them (90.6 % vs 74.2 %; p = 0.011), Fig. 1. There were no differences between the groups for other components of personal safety (Fig. 1).

Table 1
Comparison for response on social needs screening tool between groups based on adherence to exercise (n = 116).

S. No	American Association of Family Physicians Question – Response	Non-Adherent (n = 85)	Adherent (n = 31)	P-Value
1	**Are you worried or concerned that in the next two months you may not have stable housing? Response – Yes (%)**	17.6 %	25.8 %	0.430
2	**Think about the place you live. Do you have problems with any of the following? – Response: None of the Above (%)**	91.8 %	87.1 %	0.727
3	**Within the past 12 months, you worried that your food would run out before you got money to buy more? Response: Never True (%)**	68.2 %	64.5 %	0.609
4	**Within the past 12 months, the food you bought just didn't last and you didn't have money to get more. Response: Never True (%)**	68.2 %	71.0 %	0.474
5	**Do you neglect going to the doctor because of distance or transportation? Response: No (%)**	80.0 %	77.4 %	0.798
6	**In the past 12 months has the electric, gas, oil, or water company threatened to shut off services in your home? Response: Yes (%)**	1.2 %	12.9 %	0.018*
7	**Do problems getting child care make it difficult for you? Response: Yes (%)**	16.5 %	38.7 %	0.032*
8	**Unemployment (%)**	14.1 %	0.0 %	0.034*
9	**Possess High School Degree (%)**	66 (76.6 %)	29 (93.5 %)	0.050*
10	**Personal Safety Score**	4.54 ± 1.84	5.65 ± 3.24	0.024*

* indicates significant difference between the groups.

4. Discussion

In the current study we evaluated the role of socio-economic status (SES) on adherence to prescribed home-based exercises. We report that in PWE education level and employment are positively associated with adherence to exercise.

Ricke E et al [15], in a recent systematic review and *meta*-analysis of factors affecting adherence to home-based exercise program in people with chronic disease reported that socioeconomic factors reported often included – education, social support, age, gender, employment status, income, marital status and physical health". The authors further state that higher education is one of the two predictive factors of exercise adherence, better physical health being the other one. Our findings are consistent with Ricke E et al [15], where both rate of employment status and level of education were higher in PWE who adhered to exercise programs. Since the average age of our study population was nearly 27 years, and the average age of marriage in the country of current study is nearly 27, therefore marital status might not have shown predominant influence. In our previously reported study on the same cohort, we did not find difference for physical component score and mental component score on SF-12 questionnaire [16]. A findings of interest for us is that although all the PWE who adhered to exercise reported to be employed, when compared to non-adherent PWE a higher number of them report problems getting child care benefits and paying utility bills. Ideally an analysis of responsibility of the PWE in the family could answer this disparity; but we did not have relevant data to evaluate the same.

Thus, it involves a network of people—including family, friends, and community members—who are available to provide any kind of help or support. Recent research on adherence to exercise has shown that satisfactory perception of social support is associated with optimism,

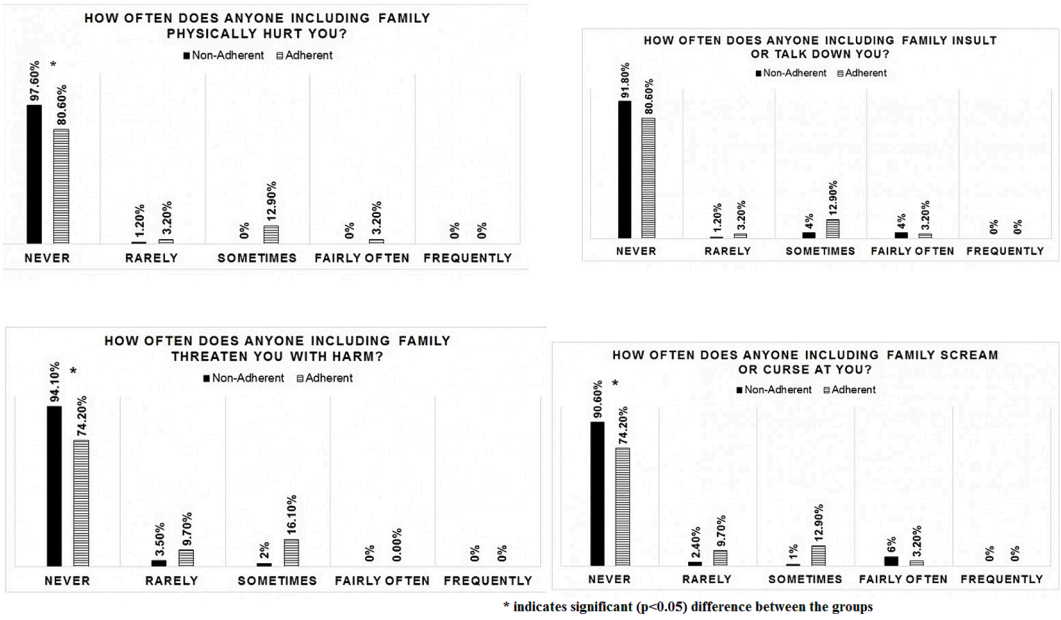

Fig. 1. Comparison between participants who were non-adherent to exercise versus those who were adherent – for response to personal safety questions.

improved self-esteem which have been associated with adherence to exercise [15,17]. In the current study, the personal safety score was higher in PWE who adhered to exercise suggesting worse personal safety. Perhaps, the care-givers' motivation to help PWE adhere to exercise was mis-perceived by the adherent group and therefore reported not to feel safe. Interestingly, the screening tool suggests that a cumulative score, if exceeds 10 should only be considered as poor personal safety. Therefore, comparison for averages in personal score may not be clinically significant. In our previous work, we report that self-motivation was more important factor associated with adherence to exercise in PWE rather than social support [13]. Future research in persuasion to exercise by family members versus perception of the same as threat by PWE may help develop better communication strategies to improve adherence to exercise in PWE.

This study has limitations that include – the prescribed exercise in the study was home-based and did not involve in-person participation of the PWE, therefore, the influence of SES may have been limited as home-based exercises eliminate the need for commute, transportation, gym membership etc. Another limitation was the definition for adherence in the current study was in answering "yes" to the question "I do my exercises as often as recommended" on EARS scale, a subjective response which may not truly reflected the actual level of exercise in the study groups. Perhaps, those who did not adhere may not have followed the home based exercise program but consistently managed to reach targets of guidelines for physical activity. Another limitation of our study is that, the participants were from a tertiary private hospital and may not be a true reflection of the community. It is very desirable to evaluate in detail the role of social support on our findings, but that was not the objective of the current study, moreover, we were limited by the sample size. Furthermore, the social needs tool was administered approximately three years after completion of the exercise study; during this time the social needs of the participants may have changed. Therefore, our results should be interpreted with caution especially the clinical applicability of our findings.

5. Conclusion

In people with epilepsy (PWE) level of education and employment are associated positively with adherence to home-based exercise programs. The role of family support and personal safety in adherence to exercise should be evaluated in detail.

CRediT authorship contribution statement

Sudhindra Vooturi: Writing – original draft, Visualization, Methodology, Investigation, Formal analysis, Conceptualization. **Bathula Siri:** Writing – original draft, Data curation. **Sai Sirisha:** Software, Project administration, Data curation. **Sita Jayalakshmi:** Writing – review & editing, Supervision, Conceptualization.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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