"Epidemiological evaluation quality of life in patients suffering from early rheumatoid arthritis: a pragmatic, prospective, randomized, blind allocation controlled of a modular program group intervention"

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Key words: Epidemiological evaluation, quality of life, early rheumatoid arthritis
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Abstract

Objectives: Epidemiology has taken on new roles in management of health care services. This pragmatic design study developed and evaluated the efficacy of a non pharmacological modular self management group intervention program (MPGI) as an adjunct therapy in patients suffering from early rheumatoid arthritis (ERA).

Methods: patients were randomized to a non-equivalent group design of active intervention (MPGI) along with the standard of care versus only standard of care at a community Rheumatology center. Outcome measures were, pain VAS (visual analog scale), patient general health (GH) on VAS and quality of life SF-36.V2 scale. Efficacy evaluation was carried out in the first week and followed by 20, 32, 48 and 60 weeks.

Results: patients were randomized 100 to the intervention group and 106 to control group. Mostly were women (86% v.s 89.6%), smoking tobacco 25% v.s 19.8%, mean (±SD) age 42.6 ± 13.2 v.s 46.6 ± 10.9 years, disease duration 15.3 ± 6.7 v.s 14.5 ± 6.6 months, in intervention and control group respectively. A comparison of the mean values showed a significant difference, and post-Hoc pairwise analysis demonstrated significant worsening in the control group compared to improvement in the intervention group, at 2\textsuperscript{nd}, 3\textsuperscript{rd}, 4\textsuperscript{th} and 5\textsuperscript{th} evaluations, the improvement was often seen as early as 12-24 week follow up.

Conclusions: Epidemiology helps investigate how well specific therapies or other health interventions prevent or control health problems. The MPGI appears to be suitable and feasible for a much more comprehensive management of early RA in socio-economically challenged communities.

KEY WORDS: Epidemiological evaluation, quality of life, early rheumatoid arthritis

Introduction

Epidemiology has taken on new roles in the management of health care services [1] for designing and managing health care for populations, effective management of resources to maintain and promote the health of populations. The incidence and prevalence of rheumatoid
arthritis (RA) is dynamic, not static, and appears to be influenced by both genetic and
environmental factors [2] (figure 1). RA is riddled with misconceptions amongst community and
patients regarding diet, exercise and lifestyle in general, and patients suffer even much more
because of lack of health information and instruction [3]. The challenge is to find a cost effective
treatment for better disease control [4]. These findings underscore the complexity of the
rheumatic diseases and highlight the key role of epidemiological research in understanding these
intriguing conditions [5]. Intervention trials in epidemiology are limited to interventions for
which there are grounds to believe that there will be a potential benefit to individuals [6, 7].
Community trials can be carried out among individuals or groups of people. Most health
education interventions can be conducted at a group level. It may be logistically easier to conduct
the trial among groups of people than among individuals [6, 7].

Pragmatic clinical trials (PCTs) are designed to determine the risks, benefits, and costs of an
intervention as they would occur in routine clinical practice [8]. PCTs are well-suited for
understanding effectiveness, evaluate effects of treatment in real-world settings[9] and help
providers decide between options for care and seek answers to whether an intervention will work
under usual conditions [10]. Typically, the findings from PCTs have high generalizability and
can inform practice because it provides evidence that the treatment/intervention is effective in
usual practice [11]. Models are useful in guiding epidemiologic research which determines
whether one group more seemingly develops a related disease than the other group [12].
Epidemiological models of community intervention [13], population-based health management
model [14], and multi-state life table model [15], have demonstrated similar consequences in
different communities. Non-pharmacological treatment modalities have been used, albeit
sparsely; as an adjunct to drug therapy in patients with RA [16].

In this pragmatic design study, purpose was to determine whether the self-management modular
program group intervention (MPGI) based on inter-disciplinary instructions, counseling and
physical therapy in addition to standard-of-care treatment helps in better outcome in patients
suffering from early rheumatoid arthritis (ERA) or these experience improvements would be
maintained in the 20th, 32nd, 48th and 60th week for 15 months. This would be indicated by
improvement indicators of their overall experienced advancement in pain (primary outcome), general
health and quality of life (secondary outcomes) in the intervention group when compared with the
control group. However, the improvements are variable according to the type of intervention; a
non-pharmacological intervention such as the present study where individuals with longer-term illness could improve patients’ lives. To my knowledge, this study is the first multimodal intervention program whose potential effectiveness is evaluated in a randomized trial in patients suffering from ERA.

**Material (subjects) and Methods**

**Study design**
From January 2011 through January 2013 conducted a pragmatic, prospective, randomized, blind (assessor), allocation controlled study of 15 months follows up duration. It was a non-equivalent group's design of active intervention with standard of care versus only standard of care. Patients attending the community based Rheumatology clinic were screened and, after consent, randomized into either an intervention or control group. Follow up visits and assessment was similar for both groups.

Prior to the intervention study, the pilot study on 140 patients was conducted to capture community demographics, disease attributes, clinical data, process of patient enrollment, develop an easy to understand and feasible the intervention MPGI packages booklet and pamphlets, assess the suitability, reliability and internal consistency of the outcome measurement instrument.

**Participants**
The inclusion criteria were adults with disease duration ≤ 2 Years, ACR 1987 criteria used for diagnosis of RA, age between 18 and 75 years, under supervised Rheumatology care in the outpatient clinic, able to read and answer the questionnaires. Exclusion criteria were subjects with the American Rheumatism Association (ARA) class IV (unable to do self care), arthritis other than the RA positive history of mental illness or alcohol or drug abuse, medical condition requires activity to restrict (e.g. History of more severe heart, lung or cerebrovascular disease), previous participation in a similar intervention program in last 1 year, patient not fit to participate as per the discretion of the rheumatologist.

A total of 227 patients were enquires and participants entering study. Resulting in 206 patients entering the study, 100 were randomized to the intervention group and 106 were randomized to control group (the difference is because of the randomization process used). There were drop outs (42 withdrew) over the subsequent study visits in both groups with 83 among intervention
group and 79 among the control group completing at 15 months and final follow up visit. After exclusion due to refusal to participate (9 patients), reading and writing difficulties (4 patients) and other factors (8 patients). 206 patients received the questionnaire at the first evaluation. After randomise allocation 13 patients refused (4 in intervention and 9 in the control group), 22 patients (9 in interventions, 13 in control groups) did not answer or complete filling the questionnaire. 9 patients (4 in intervention and 5 in control groups) could not be reached within the stipulated time (Figure 2).

The study was approved by the ethics committee of deputy for medical education and deputy for research, University of medical sciences, Bandar Abbas, Hormozgan, Iran. (Dissertation number: HEC-92-4-25-3, Approve date: 16/07/2011) Ethic committee clearance and permission obtained whenever based on the requirement of participation center. Informed consent was undertaken in both verbal and written format from every participant of the study.

Procedures
Patients of ERA were informed by personal invitation or on the phone and recruited from the community based Rheumatology clinic (under school of medicine in Hormozgan University of medical sciences), Bandar Abbas, Hormozgan province (North of Persian Gulf, South Iran). “Hormozgan province, district is covering an area of 68475/8sq. Km and divisions have 34 towns, 14 islands, 29 rural districts and 79 villages. Its center is Bandar Abbas. Hormozgan province is situated in the warm and dry zone of Iran having arid and semi-arid climate”. Participant attending the community Rheumatology clinic was screened by a rheumatologist (AC, RF) and eligible after filling consent form, then randomized into either an intervention or control group. Subject underwent an orientation session where the researcher (HY) introduced them to the intervention program and the study. The importance of their role function in the study process was emphasized. Subjects were informed of the schedule of visits of the entire study in the first meeting itself. Subjects were randomized into intervention and control groups by a four ball techniques where a patient was asked (HY) to remove a ball from a bag of four balls with markings for the intervention and control group on two balls each. Subjects were coded (HY) for the study simultaneously. Subjects filled the questionnaire under guidance of investigators (HY) during the first visit only. All patients during follow up visits filled and completed an expanded health questionnaire as per protocol and directly submitted it the reception counter (FA).
patient before the Rheumatologist (RF) meeting would collect the questionnaires from the reception counter and fill them independently in a waiting room. After submission of the same at the reception counter (FA) they would proceed for routine Rheumatology consultation. The Rheumatologist (RF) and the clinic Rheumatology nurses (FA) handling the standard of care Rheumatology outpatient and provided Rheumatology services (diagnosis and treatment) and remained blind (allocation to intervention and control) throughout the study. The patients were requested not to discuss their treatment allocation in the Rheumatology team. Reminders were given 2-3 weeks in advance of the scheduled visit. In case of any absentee, a review consultation was arranged within maximum 3 days of the scheduled visit. Both groups received logistic reminders in 18th, 30th, 44th and 56th week. Intervention group receiver intervention reminders on 12th, 24th, 42nd and 54th week. An intervention refresh session was conducted in the 32nd week for the intervention group.

To ensure compliance the subjects were assisted in following manner: travelling allowance for each visit, minimal waiting period for consultation with a Rheumatologist and refreshments offered. All patients received standard of care, medication from the Rheumatologist. The treating Rheumatologist was permitted to alter medicine as per his/her discretion and clinical judgment at all time, and had access to all case record forms. The study related Rheumatologist was kept blind to the intervention allocation of the patients.

Treatment interventions

Standard of care medical treatment
This was provided by Rheumatology team members experienced in program delivery. No additional training was needed. A program manual was developed from observation of the existing program. All patients evaluated by Rheumatologist for standard of care medical treatment. Rheumatology nurses/paramedics handled patient centric issues of function and quality of life measurement and advice. They helped in logistical support.

Modular program group intervention (MPGI)
The MPGI was based on interdisciplinary instruction, counseling and physical therapy (exercises). Place of intervention meeting was a community based Rheumatology clinic, the patients in the intervention group were divided in 10 groups of 10 patients each. Each group
received one session weekly for 2.5 hours for the first eight weeks of the study. The intervention me consisted of 8 weekly workshops for each group spread over 8 weeks. 1st 2 weeks the sessions were on improvement in knowledge, attitude and practice of patients with RA. The 3rd workshop was on pain management. The groups received two sessions over exercise, physical therapy program and joint protection in the 4th and 5th week. In the 6th week the session was on nutrition management and healthy diet information. Session over fatigue control and stress management was conducted in the 7th week. A review session for all the above workshops was conducted in the 8th week. The meetings were highly interactive, focusing on building skills, sharing experiences and support apart from the scheduled intervention programs. Participant in the intervention groups were regular for most of the sessions. Subjects were handed arthritis research campaign and arthritis care package (booklets and 10 pamphlets) which introduced them to rheumatoid arthritis and described information regarding patient care. Patients received a program booklet and 10 pamphlets with the information on the session.

**Evaluation**

Participants in the intervention and control group filled the baseline questionnaire under guidance of the investigator during the first visit only. At every visit patients filled an expanded health questionnaire which was coded and directly submitted to at the reception counter. All participants also completed (by a Rheumatologist / nurse) standard of care Rheumatology case record forms which included joint counts for pain/tenderness and swelling, pain, visual analogue scale, global assessments of disease activity by physician and patient, any side effects of ongoing drug treatment and laboratory investigations. All patients gave informed consent for completion of the Rheumatology case record form for screening visit. After the enrollment we went through 8 weeks of intervention and all patients came for follow ups every 12 weeks in the 20th, 32nd, 48th and 60th week where they received standard of care treatment.

**Sample size**

For this study, the sample size was calculated for ‘Pain visual analog scale (VAS), as it is the most important parameter of evaluation/assessment of the study. Difference with respect to ‘Reduction in Pain VAS’ was considered as the required parameter/variable of interest. However, such a study as the current one could not be found in the reviewed published literature from the
Iranian or Indian community, and thus there was no other a-priori data on important health measures (current study) for consideration to compute sample size. Here calculations are shown for ‘Reduction in Pain VAS’ = 7% [17] with power = 80% and significance level of 5%.

**Analysis plan**

Standard Rheumatology case record forms (CRF) were used to capture clinical data. Patient centric data, including all questionnaires were obtained from patient reported outcomes (PRO) and interviews supervised. PRO included general health on VAS, which time interval evaluated during the past week (7 days), horizontal line anchored at 0 for perfect health (no disease activity) and 100 for intensely weak health (highest disease activity possible); pain VAS at rest which time interval evaluated during the past week (7 days), horizontal line anchored at the ‘0’ mark, it says ‘no pain at all’, and at the ‘100’ mark, ‘pain as bad as it could be’ were recorded by the patient and physician. The short form/SF36.V2 (with permission) [18], versions (the scale score is calculated by summation of all the scores of items belonging to the same scale from 0 to 100 (worst = 0, best = 100) with higher scores indicating higher levels of function and or better health. SF-36.v2 component summary measures: physical component scale (PCS) and mental health component scale (MCS), SF-36.v2 health domain scales: PF, physical functioning, RF, role physical, BP, bodily pain severity, GH, general health, VT, vitality, SF, social function, RE, role emotional MH, mental health.

Laboratory tests included erythrocyte sedimentation rate (ESR, first hour mms by Westergren) and c-reactive protein (CRP). The most recent rheumatoid factor (RF) values were collected; RF was considered positive if it was positive, according to the local reference values at any time over the disease course. We also collected information on arthritis medication usage consists of the analgesics, nonsteroidal anti-inflammatory drugs (NSAID), corticosteroids, non biological disease-modifying anti-rheumatic drugs (DMARD), and biologic therapies.

Data processing and analyses were conducted using bio-medical data package (BMDP) new system 2.0 with BMDP dynamic release 7.0 used. Mean scores of the clinical assessment, health status and quality of life scales used in the analyses are expressed as the percentage of the predicted value based on the subject- specific gender, age, disease duration, study years and family size. The normality of the variables was tested by the Shapiro-Wilk test. General linear model- repeated measures analysis of variance method, Post Hoc test, pairwise comparisons with
Bonferroni’s adjustment and estimated marginal mean values of the scales at each evaluation stage pertaining to the objective were undertaken. These analyses were repeated with age, disease duration, gender and school years as covariates. Subsequently the cross tabulation of each explanatory variable on outcome variable was done and tested using Chi-square test ($\chi^2$) for categorical variables, paired t-test or Wilcoxon signed-rank test when data are quantitative. Correlation coefficients were also estimated for appropriate pairs.

**Results**

In intervention and control group mean (±SD) age of study participants was 42.6 ± 13.2 v.s 46.6 ± 10.9 years, disease duration was 15.3 ± 6.7 v.s 14.5 ± 6.6 months, respectively. In both groups, mostly were women, 86% v.s 89.6% and married 88% v.s 94.3%. In the middle class of the social class, 69.0% v.s 72.6%, smoking tobacco was 25% v.s 19.8%, in intervention and control group respectively. There were no significant differences in both groups (Table 1).

Out of the pilot study showed that measuring instruments were fit to be used in the main explanatory study and were validated. Patients in both the arms of the interventional study improved significantly (often p<0.05) for several clinical variables, ACR indices, pain VAS, GH VAS, SF 36 physical and mental components and 8 domains, on study completion at 60 weekend point; the improvement was often seen as early as 12-24 week follow up (Table 2).

There were no significant differences at baseline between the study groups for use of pain medication in both groups (Table 1). It can be concluded that use of pain medication in both groups in the intervention and control group was similar but a few exceptions between them were due to chance (although the allocation was done by randomization).

A post-Hoc pairwise analysis (Bonferroni adjustment) between evaluation visits was done and showed significant worsening change in the control group compared to improvement in the intervention group in the mean values of the pain VAS, GH VAS, PCS, MCS and most 8 domains scores which continued for a larger period as compared to values at 1st and follow up evaluation (Table 3).

A comparison of the mean values of the pain VAS, GH VAS, PCS, MCS and 8 domains of SF36 scores at each evaluation stage showed significant difference between GH VAS, PCS and MCS, PF, RP, VT, RE scores at 3rd, 4th and 5th evaluations, GH and MH at 4th and 5th evaluations, SF at 2nd, 4th and 5th evaluations, which mean values were higher in the intervention group. There was
significant difference between pain VAS and BP domain of 2\textsuperscript{nd}, 3\textsuperscript{rd}, 4\textsuperscript{th} and 5\textsuperscript{th} evaluations, which mean values were lower in the intervention group (Table 2 and 4). Therefore, this indicates an observable impact on self-management program on the PCS, MCS and 8 domains scores of the intervention groups.

The median PCS and MCS scores increased from 60.50 to 66.9 and 57.67 to 65.25 respectively in the intervention group at the start of the study to after 15 months. The median PCS and MCS scores decreased from 60.21 to 51.43 and 58.32 to 46.32 respectively in the control group at the start of the study to after 15 months. Which indicates that the PCS and MCS scores in the intervention group were significantly higher than the control group at 8 months, 12 months and 15 months end point follow up visits.

**Discussion**

The hypothesis of the present study was MPGI in addition to standard-of-care treatment helps in better outcomes of general health on VAS, pain VAS (unidimensional single-item scale that provide an estimate of patients' pain intensity) and functional status and generic quality of life [short form/SF 36.V2 (Physical and Mental component scales)] scores in patients suffering from ERA. The SF-36 questionnaire is a generic multidimensional pain measure and bodily pain scale (SF-36 BPS), is useful in evaluating pain in the context of overall health status, and therefore most suitable for use in making comparisons across populations. A study intended to determine the general demographic characteristics, to compare baseline and 2\textsuperscript{nd}, 3\textsuperscript{rd}, 4\textsuperscript{th} and 5\textsuperscript{th} follow up evaluations in within and between the intervention and control groups.

The key results of the current community study showed clinically much more impressive and often statistically significant (p<0.05) improvement in RA outcomes, both short term and long term, for physician and patient global health assessment, PCS, MCS components and 8 domains of SF36 scores in 1\textsuperscript{st} and 15 months follow up evaluation stages, with special reference to functional status and generic quality of life in the intervention group when compared to the control group.

Pharmacological treatment has recently seen great advances but is associated with increased toxicity and cost also the long term outcome is still unknown. Non pharmacological treatment is cheap, less toxicity better long term outcome [19]. 75\% of the patients do not achieve full remission and 15\% have a sustained high or moderate disease
activity in the first 3 years onset of the disease [20]. The burden of rheumatoid arthritis disorder and issues of impaired quality of life has become an international health priority with initiatives such as the Bone and Joint Decade launched by the World Health Organization (WHO) [21]. Disease activity and quality of life (QOL) including functional status in RA is influenced by several ethnic, cultural and other factors. Standard of care management should cater for country specific needs. The mechanism of MPGI is the possibility of acquired ability of patients to improve coping, self efficacy and self management.

Several non pharmacological clinical experimental methods and or models [22-26] were evaluated in patients suffering from arthritis, and RA in particular, to determine “how best can the needs of the patient be met using methods in addition to standard of care therapy?” [27]. This community clinical study was focused on the role of a planned, structured non pharmacological intervention MPGI in patients suffering from early rheumatoid arthritis and treated with standard of care treatment in community Rheumatology clinic. Multimodular non pharmacological interventions like self management programs seem to have strong evidence to be recommended for a community or clinical setting [25]. The unimodular interventions like exercise [26], cognitive therapies [23] and orthoses [16] show promises but need further research. The role of dietary modification is exciting [28], but needs further studies to form a guideline. These interventions can serve as a cost effective strategy to support standard treatment. Challenge henceforth is to further investigate these interventions to be tailored to meet different cultural and individual need. The timing and duration of these options are still a matter for research.

A review study by Vliet Vlieland 2009 [16] summarized the available evidence on the effectiveness of non-pharmacological therapies in early RA. The effectiveness of multidisciplinary team-care programs, specialist nursing care, electro-physical modalities (including passive hydrotherapy), wrist orthoses, and dietary interventions has not been studied in patients with early RA. An attempt would be made to support current finding by referring to the previous research done in this field.

Research investigation took into account any change in health status and context of quality of life between the intervention and control groups. The results of the current explanatory study provide new comprehensive information about non pharmacological intervention and introduce a new model of self management group intervention (MPGI) in patient suffering from early RA. And
this study of 15 months was designed keeping in mind the chronic nature of RA and the need to demonstrate sustained improvement over time. The present study is also the only study to focus on early RA. It is now evident early intervention leads to arrest of symptoms and disease process and prevents articular deformities [29].

The American College of Rheumatology (ACR) has published explicit management guidelines [30] and described a ‘window of opportunity’ in the very early period of clinical RA that can be effectively targeted to control the disease and prevent articular deformities and other future RA complications. And several studies thereafter have demonstrated the excellent therapeutic response in early RA [29].

The base of the self-management MPGI designed by current researchers lay on, highly interactive meetings, focus on building skills, and share experiences and support. Participants in group intervention suffering from the same disease and sharing the same complaints, and experiencing the same complications will be able to share useful personal experiences and help each other in practice sections, thereby increasing the potential to modify and change the attitude for increased learning.

Present study results showed significant difference between mean values of the pain VAS score at 2nd, 3rd, 4th and 5th evaluation (mean values were lower) and of the general health VAS score at 3rd, 4th and 5th evaluation, (mean values were higher) in intervention as compared to control groups. This indicates an observable impact of MPGI of the pain VAS and general health VAS for intervention groups. A pairwise analysis showed significant reduction in pain VAS and significant improvement in general health VAS continued for a larger period as compared to values at 1st and 2nd evaluation in the intervention group. The reduction on the 25th and 75th percentile pain VAS value and general health VAS in the intervention group to value of 20 and less on study completion in the intervention group was impressive and further supports the positive impact of the MPGI in this study.

Several studies using multi modular program made similar observations in different groups of subjects, and noted a significant decrease in pain VAS and improvement of the general health [23, 26].

The results of the current study demonstrated a significant difference between SF36- physical component scale, mental health component scale and 8 domains at 3rd, 4th and 5th evaluation; mean values were higher in the intervention group in comparison to the control group. The SF-36
scale has good reliability and validity for both clinical and healthy community-based samples, and it provides the opportunity for interesting comparisons of the life quality of healthy individuals, and those with rheumatic conditions and other chronic physical conditions [21]. Measures such as the SF-36 to provide the building blocks to create models of quality of life, and study the different perspectives of this process across a range of chronic physical conditions as well as healthy individuals. Within this framework, using generic measures of quality of life can offer opportunities to frame research and interventions that appropriately target the quality of life of individuals with RA disorder [21].

Goeppinger et al (2007) showed that improvement was achieved in reducing functional disability as well as self-related health and social role limitations in a randomized control trial [31]. The findings from the current study research confirm this and demonstrate the wider influence of the patient’s self-management modular program.

RA has been shown to have moderate to high risk of work disability even in early (less than 18 months) disease. This was associated with physical dysfunction and pain that are modifiable factors [4]. Medical care costs for RA over 1 year and 1 decade are highly skewed, and determine that the most consistent and strongest factor is functional status of the individual [32]. A community friendly intervention program provides a major support to the patient. It also provides better awareness of the ailment and thereby enhances the confidence to self manage health problems with greater courage. It also encourages better compliance of the drug management program, regular assessment and monitoring of disease and drug related effects, progressive awareness, and goal setting for the treatment and achieving targets in the set time. The first aim of a combined strategy with supervised sustained standard of care medical management, and self-management program is to obtain an early remission of the disease. The next target is to bring the body to a fully functional status, and resume work with great physical and mental involvement, and all this may also require vocational rehabilitation [33]. Above all, it is mandatory to ensure full patient co-operation of the self-management program [34]. The concept of community-level variety introduces a special challenge in the design and investigation of community intervention studies. It can be seen as an included wellspring of variety in health behaviors or results that influences estimation of an intervention effect, or as connection of wellbeing related attributes among individuals in a community [7]. In either occasion, it must be assessed from recorded information or from outer sources in order to
estimate study power or sample-size necessities, and it must be obliged in the information investigation system to abstain from overestimating program effectiveness[7].

The overall success of the current study could not have been possible without an active and robust participation by the study patients. An equally important consideration is the measure of disease process and therapeutic outcome. Patients in our setting will settle for nothing less than the restoration of the normal traditional life style after successful treatment. Standard instruments like SF 36 must be able to capture the true extent of functional disability and QOL in our setting, and thus need to be modified and validated. The current study used modified and validated SF 36 [18] suitable for the community, in local language and hence our study assumes significance.

The current study had several limitations. It seemed difficult to adjust for several potential confounding that were not considered or not known at the time of design. Patients with disease less than 2 years duration were selected and the results of the study may have limited application to patients with chronic RA and rheumatoid deformities. The therapeutic approach advocated in the current research study would require important modification and re-evaluation. Some confounders were managed by suitable randomization and blinding. The study related Rheumatologist was kept blind to the intervention allocation of the patients. The patients were requested not to discuss their treatment allocation in the Rheumatology team. Reminders were given 2-3 weeks in advance of the scheduled visit. It is possible that some patients from the intervention and control groups exchanged information regarding study intervention. However, prolonged 15 month duration of the study was felt suitable to capture the early and late effects of intervention and soften the influence of some patient centric confounded (diet, life style, dilution of strict randomization and blinding). There were several strengths of the study especially with respect to the design of a community friendly intervention program and it was strongly based in the community.

In conclusion, these findings have implications for health policy, and allocation of funding for both healthcare and research. Ethnicity, presumably, may play a major role in the extent of coping with pain and arthritis. Several other lifestyle risk factors connected with the environment can be potentially modifiable. Our results can be exploited further by constructing preventive instructional non pharmaceutical strategies to treat RA that is suited to the community. Lifestyle risk factors are the result of our environment, and some of these may be modified or changed. Newer approaches to examine disability acknowledge the roles of demographic, physiological,
psychological, social and environmental factors which act as buffers and exacerbate poor outcomes in chronic physical conditions. Research helps health care providers to develop a systematic problem-solving approach to improve and develop strategies to promote good health for individuals. A longer period of intervention using non pharmacological methods besides the standard of care treatment and follow up would be mandatory to evaluate the true value of such a combined approach.

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References

6- Koepsell TD. Epidemiologic issues in the design of community intervention trials. Applied Epidemiology (eds Brownson RC & Petitti DB), 1998; Chpter 7: 177-211.


Table 1: Baseline evaluation of patients suffering from early rheumatoid arthritis

<table>
<thead>
<tr>
<th></th>
<th>Intervention MPGI n=100</th>
<th>Control n= 106</th>
<th>P-Value</th>
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</thead>
<tbody>
<tr>
<td>Weight mean (S.D.), Kg</td>
<td>61.09(10.31)</td>
<td>61.64(7.49)</td>
<td>0.660*</td>
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<tr>
<td></td>
<td>61.00</td>
<td>61.50</td>
<td></td>
</tr>
<tr>
<td>Disease duration, mean (S.D.), month</td>
<td>15.29(6.73)</td>
<td>14.52(6.67)</td>
<td>0.493*</td>
</tr>
<tr>
<td></td>
<td>17.50</td>
<td>16.50</td>
<td></td>
</tr>
<tr>
<td>Duration of schooling, mean (S.D.), year</td>
<td>7.60(5.18)</td>
<td>6.51(5.28)</td>
<td>0.098*</td>
</tr>
<tr>
<td></td>
<td>5.00</td>
<td>5.00</td>
<td></td>
</tr>
<tr>
<td>Age mean (S.D.), year</td>
<td>42.90(13.24)</td>
<td>46.60(10.97)</td>
<td>0.07*</td>
</tr>
<tr>
<td></td>
<td>40.00</td>
<td>48.00</td>
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</tr>
<tr>
<td>Family Size, mean (S.D.)</td>
<td>4.21(1.42)</td>
<td>5.01(2.29)</td>
<td>0.051*</td>
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<tr>
<td></td>
<td>4.00</td>
<td>5.00</td>
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<tr>
<td>Gender, n (%)</td>
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<tr>
<td>Female</td>
<td>86(86.00)</td>
<td>95(89.60)</td>
<td>0.280**</td>
</tr>
<tr>
<td>Male</td>
<td>14(14.00)</td>
<td>11(10.40)</td>
<td></td>
</tr>
<tr>
<td>Residency, n (%)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Urban</td>
<td>75(75.00)</td>
<td>83(78.30)</td>
<td>0.346**</td>
</tr>
<tr>
<td>Rural</td>
<td>25(25.00)</td>
<td>23(21.70)</td>
<td></td>
</tr>
<tr>
<td>Sleep pattern, n (%)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Normal</td>
<td>58(58.00)</td>
<td>52(49.10)</td>
<td>0.216**</td>
</tr>
<tr>
<td>Mild loss</td>
<td>26(26.00)</td>
<td>30(28.30)</td>
<td></td>
</tr>
<tr>
<td>Disturb</td>
<td>16(16.00)</td>
<td>18(16.98)</td>
<td></td>
</tr>
<tr>
<td>Smoking tobacco</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>25(25.00)</td>
<td>21(19.80)</td>
<td>0.234**</td>
</tr>
<tr>
<td>No</td>
<td>75(75.00)</td>
<td>85(80.20)</td>
<td></td>
</tr>
<tr>
<td>RF, mean (S.D.) (Normal value = &lt;40 U/mL)</td>
<td>137.63(119.37)</td>
<td>122.79(103.20)</td>
<td>0.340*</td>
</tr>
<tr>
<td>CRP, mean (S.D.) (Normal value = 0.0-0.8 mg/dL)</td>
<td>48.04(28.78)</td>
<td>45.65(24.34)</td>
<td>0.902*</td>
</tr>
<tr>
<td>MTX dosage (mg/week)b, mean (S.D.)</td>
<td>10.5</td>
<td>10.04</td>
<td>0.510</td>
</tr>
<tr>
<td></td>
<td>(4.71)</td>
<td>(5.11)</td>
<td></td>
</tr>
<tr>
<td>Steroid dosage, mean (S.D.) (mg/daily) b</td>
<td>5.32</td>
<td>5.21</td>
<td>0.474</td>
</tr>
<tr>
<td></td>
<td>(1.10)</td>
<td>(1.20)</td>
<td></td>
</tr>
<tr>
<td>Pain Killer , n (%)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>18(18)</td>
<td>21(19.8)</td>
<td>0.439</td>
</tr>
<tr>
<td>No</td>
<td>82(82)</td>
<td>85(80.2)</td>
<td></td>
</tr>
</tbody>
</table>

* P value by Student’s’ ‘t’ test or Mann-Whitney ‘U’ test
** P value by Chi-square test

RF, rheumatoid factor; CRP, C reactive protein; S.D, standard deviation; MTX, methotrexet.
Table 2: Comparing mean values of the clinical and quality of life (SF-36 component) variables at each evaluation stage

<table>
<thead>
<tr>
<th></th>
<th>1st Evaluation (Base line)</th>
<th>2nd Evaluation (5 Months)</th>
<th>3rd Evaluation (8 Months)</th>
<th>4th Evaluation (12 Months)</th>
<th>5th Evaluation (15 Months)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Intervention (n=100)</td>
<td>Intervention (n=90)</td>
<td>Intervention (n=80)</td>
<td>Intervention (n=80)</td>
<td>Intervention (n=79)</td>
</tr>
<tr>
<td></td>
<td>Control (n=106)</td>
<td>Control (n=90)</td>
<td>Control (n=80)</td>
<td>Control (n=80)</td>
<td>Control (n=79)</td>
</tr>
<tr>
<td>GH (VAS) a</td>
<td>43.7 (11.4)</td>
<td>29.9 (10.9)</td>
<td>31.7 (10.7)</td>
<td>&lt;0.001</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Mean (S.D)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pain (VAS) a</td>
<td>48.5 (14.0)</td>
<td>49.7 (12.8)</td>
<td>34.1 (12.8)</td>
<td>&lt;0.001</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Mean (S.D)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PCS a</td>
<td>61.72 (9.42)</td>
<td>60.26 (9.46)</td>
<td>60.94 (9.46)</td>
<td>0.273</td>
<td>0.002</td>
</tr>
<tr>
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</tr>
<tr>
<td>MCS a</td>
<td>59.46 (9.84)</td>
<td>60.84 (10.25)</td>
<td>59.84 (11.23)</td>
<td>0.325</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*a: GH, general health visual analog scale (VAS). Score 0-100 at 0 for perfect health (no disease activity) and 100 for intensely weak health (highest disease activity possible); pain VAS, visual analogue scale. Score 0 – 100 mm at the ‘0’ mark, it says ‘no pain at all’, and at the ‘100’ mark, ‘pain as bad as it could be’; PCS, Physical component scale. Range is 0 – 100 (worst = 0, best = 100) with higher scores indicating higher levels of function and or better health.; MCS, mental component scale. Range is 0 – 100 (worst = 0, best = 100) with higher scores indicating higher levels of function and or better health

*Student’s ‘t’ test. **Man Whitney ‘U’ test
Table 3: Repeated measures analysis of variance for pair wise comparisons in mean values of the clinical and quality of life variables (SF-36 component) at each evaluation stage

<table>
<thead>
<tr>
<th>Pairwise comparison</th>
<th>GH (VAS) (^a)</th>
<th>Pain (VAS) (^a)</th>
<th>PCS (^a)</th>
<th>MCS (^b)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Intervention</td>
<td>Control</td>
<td>Intervention</td>
<td>Control</td>
</tr>
</tbody>
</table>
| 1\(^{st}\) Evaluation and 2\(^{nd}\) Evaluation | 13.5  
(0.071) | 11.1  
(0.071) | 21.2  
(0.071) | 28.9  
(0.071) | -0.3  
(1.000) | -0.8  
(1.000) | -1.738  
(1.000) | -1.840  
(1.000) |
| 1\(^{st}\) Evaluation and 3\(^{rd}\) Evaluation | 22.5  
(0.071) | 9.2  
(0.071) | 30.2  
(0.071) | 17.3  
(0.071) | -1.1  
(1.000) | 4.4  
(0.041) | 6.048  
(<0.001) | 3.935  
(0.185) |
| 1\(^{st}\) Evaluation and 4\(^{th}\) Evaluation | 21.7  
(0.071) | 12.4  
(0.071) | 28.6  
(0.071) | 25.8  
(0.071) | -5.6  
(<0.001) | 6.5  
(<0.001) | -5.163  
(0.006) | 6.431  
(0.001) |
| 1\(^{st}\) Evaluation and 5\(^{th}\) Evaluation | 27.2  
(<0.001) | 11.9  
(<0.001) | 34.0  
(<0.001) | 22.7  
(<0.001) | -8.8  
(<0.001) | 10.1  
(<0.001) | -10.839  
(<0.001) | 12.385  
(0.001) |
| 2\(^{nd}\) Evaluation and 3\(^{rd}\) Evaluation | 9.0  
(<0.001) | -1.9  
(1.000) | 9.1  
(<0.001) | -11.5  
(<0.001) | -0.7  
(1.000) | 5.2  
(0.003) | -4.310  
(0.132) | 5.776  
(0.001) |
| 2\(^{nd}\) Evaluation and 4\(^{th}\) Evaluation | 8.2  
(<0.001) | 1.3  
(1.000) | 7.4  
(<0.001) | -3.0  
(0.199) | -5.3  
(<0.005) | 7.3  
(<0.001) | -3.425  
(0.681) | 8.272  
(0.001) |
| 2\(^{nd}\) Evaluation and 5\(^{th}\) Evaluation | 13.7  
(<0.001) | 0.8  
(1.000) | 12.8  
(<0.001) | -6.2  
(<0.001) | -8.5  
(<0.001) | 10.9  
(<0.001) | -9.101  
(<0.001) | 14.225  
(0.001) |
| 3\(^{rd}\) Evaluation and 4\(^{th}\) Evaluation | -0.8  
(1.000) | 3.2  
(0.280) | -1.7  
(1.000) | 8.5  
(<0.001) | -4.6  
(<0.001) | 2.1  
(1.000) | 0.885  
(1.000) | 2.496  
(1.000) |
| 3\(^{rd}\) Evaluation and 5\(^{th}\) Evaluation | 4.7  
(<0.001) | 2.7  
(0.536) | 3.7  
(<0.001) | 5.3  
(<0.001) | -7.8  
(<0.001) | 5.7  
(0.012) | -1.738  
(1.000) | -1.840  
(1.000) |
| 4\(^{th}\) Evaluation and 5\(^{th}\) Evaluation | 5.5  
(<0.001) | -0.5  
(1.000) | 5.4  
(<0.001) | -3.2  
(0.197) | -3.2  
(0.007) | 3.6  
(0.028) | -0.648  
(<0.001) | 3.935  
(0.185) |

\(a\): GH, general health visual analog scale (VAS). Score 0-100 at 0 for perfect health (no disease activity) and 100 for intensely weak health (highest disease activity possible); pain VAS, visual analog scale. Score 0 – 100 mm at the ‘0’ mark, it says ‘no pain at all’, and at the ‘100’ mark, ‘pain as bad as it could be’; PCS, Physical component scale. Range is 0 – 100 (worst = 0, best = 100) with higher scores indicating higher levels of function and or better health.; MCS, mental component scale. Range is 0 – 100 (worst = 0, best = 100) with higher scores indicating higher levels of function and or better health.

\(b\): adjustment for multiple comparisons: Bonferroni
Table 4: Comparing mean values of the quality of life (SF36 – 8 domains) variables at each evaluation stage

<table>
<thead>
<tr>
<th></th>
<th>1st Evaluation (Base line)</th>
<th>2nd Evaluation (5 Months)</th>
<th>3rd Evaluation (8 Months)</th>
<th>4th Evaluation (12 Months)</th>
<th>5th Evaluation (15 Months)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Intervention (n=100)</td>
<td>Control (n=106)</td>
<td>Intervention (n=96)</td>
<td>Control (n=93)</td>
<td>Intervention (n=91)</td>
</tr>
<tr>
<td></td>
<td>Intervention (n=88)</td>
<td>Control (n=83)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Intervention (n=83)</td>
<td>Control (n=79)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PF</td>
<td>Mean (S.D)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>62.03 (11.30)</td>
<td>62.38 (20.49)</td>
<td>0.881</td>
<td>64.05 (14.43)</td>
<td>65.69 (16.99)</td>
</tr>
<tr>
<td></td>
<td>66.65 (19.49)</td>
<td>65.98 (19.06)</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>RP</td>
<td>Mean (S.D)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>69.38 (10.60)</td>
<td>67.74 (17.77)</td>
<td>0.854</td>
<td>71.09 (15.25)</td>
<td>69.86 (17.90)</td>
</tr>
<tr>
<td></td>
<td>70.66 (12.81)</td>
<td>67.67 (11.90)</td>
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</tr>
<tr>
<td>BP</td>
<td>Mean (S.D)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>44.82 (14.44)</td>
<td>14.93 (18.44)</td>
<td>0.856</td>
<td>34.04 (12.37)</td>
<td>29.58 (11.93)</td>
</tr>
<tr>
<td></td>
<td>41.95 (12.35)</td>
<td>30.64 (17.31)</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>GH</td>
<td>Mean (S.D)</td>
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<tr>
<td></td>
<td>56.92 (11.47)</td>
<td>57.69 (18.44)</td>
<td>0.718</td>
<td>60.25 (14.37)</td>
<td>58.41 (14.29)</td>
</tr>
<tr>
<td></td>
<td>58.41 (11.82)</td>
<td>57.95 (12.85)</td>
<td></td>
<td></td>
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<tr>
<td>VT</td>
<td>Mean (S.D)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>58.02 (13.90)</td>
<td>60.87 (11.82)</td>
<td>0.714</td>
<td>55.72 (13.50)</td>
<td>58.29 (11.59)</td>
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<tr>
<td></td>
<td>60.87 (11.82)</td>
<td>55.72 (13.50)</td>
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<tr>
<td>SP</td>
<td>Mean (S.D)</td>
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<tr>
<td></td>
<td>68.45 (15.74)</td>
<td>65.77 (18.60)</td>
<td>0.841</td>
<td>66.56 (14.63)</td>
<td>62.02 (16.79)</td>
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<tr>
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<td>66.56 (14.63)</td>
<td>62.02 (16.79)</td>
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<tr>
<td>RE</td>
<td>Mean (S.D)</td>
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<td></td>
<td>78.96 (18.80)</td>
<td>75.41 (12.70)</td>
<td>0.000</td>
<td>75.00 (12.70)</td>
<td>71.58 (16.12)</td>
</tr>
<tr>
<td></td>
<td>75.41 (12.70)</td>
<td>71.58 (16.12)</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>MH</td>
<td>Mean (S.D)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>64.15 (13.30)</td>
<td>66.56 (18.60)</td>
<td>0.000</td>
<td>66.74 (18.68)</td>
<td>61.78 (11.09)</td>
</tr>
<tr>
<td></td>
<td>66.74 (18.68)</td>
<td>61.78 (11.09)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* Man Whitney 'U' test  

a: PF, physical functioning domain. Score is 0 – 100 where 0 is denoting poor and 100 is denoting high; RF, role physical domain. Score is 0 – 100 where 0 is denoting poor and 100 is denoting high; BP, bodily pain severity domain. Score is 0 – 100 where 0 is denoting poor and 100 is denoting high; GH, general health domain. Score is 0 – 100 where 0 is denoting poor and 100 is denoting high; VT, vitality domain. Score is 0 – 100 where 0 is denoting poor and 100 is denoting high; SF, social function domain. Score is 0 – 100 where 0 is denoting poor and 100 is denoting high; RE, role emotional domain. Score is 0 – 100 where 0 is denoting poor and 100 is denoting high; MH, mental health domain. Score is 0 – 100 where 0 is denoting poor and 100 is denoting high.
Figure 1: Web of causation model applied to rheumatoid arthritis
Sample recruitment and response rate

Participants entering study = 227

Excluded (n = 21) →

Not satisfying study criteria's (n = 12)
Non-consenting (n = 9)

Consenting, eligible and randomize allocation n = 206

Allocated to intervention group n = 100
Allocated to control group n = 106

Consenting and baseline evaluation and received intervention n = 100

Lost to follow up evaluation n = 4
Second follow up evaluation n = 96
Lost to follow up evaluation n = 5
Third follow up evaluation n = 91
Lost to follow up evaluation n = 3
Fourth follow up evaluation n = 88
Lost to follow up evaluation n = 5
Fifth follow up evaluation n = 83

Lost to follow up evaluation n = 13
Second follow up evaluation n = 93
Lost to follow up evaluation n = 6
Third follow up evaluation n = 87
Lost to follow up evaluation n = 4
Fourth follow up evaluation n = 83
Lost to follow up evaluation n = 4
Fifth follow up evaluation n = 79

Total Lost follow up evaluation n = 17

Total Lost follow up evaluation n = 27

Figure 2: Sample recruitment and response rate (sample size)