Original Article

Effects of Acceptance and Commitment Therapy-Based Intervention on Biological, Psychological, and Social Indicators of Women Aged 35-65 Years with Human Papillomavirus Infection

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Abstract

Background and Objective: In recent years, the incidence of Human Papillomavirus (HPV) infection has increased, and besides the physical complications, the virus results in psychological problems in the affected group. Therefore, it is required to implement targeted health interventions for the individuals affected by this virus. In this regard, the present research aimed to compare the effectiveness of Acceptance and Commitment Therapy (ACT)-based interventions on biological, psychological, and social indicators of women aged 35-65 years who suffer from HPV.

Materials and Methods: This quasi-experimental study with pre-and post-test design and a two-month follow-up was conducted on 30 HPV-infected women living in Dubai, United Arab Emirates. Through purposive sampling, 30 subjects were selected and randomly allocated to either the ACT or the control group (n = 15 per group). The training intervention consisted of eight 90-minute sessions according to the ACT-based program. The data were collected by standard Depression Anxiety and Stress Scale-21 items (α = 0.82) and Marlowe–Crowne Social Desirability Scale (α = 0.70), which were completed by both groups before, immediately after the intervention, and two months later.

Results: The results revealed no critical difference between the groups at the pre-test and post-test stages in terms of reducing the mean value of the virus, lowering stress, anxiety, and depression, and increasing social desirability ($p < 0.001$).

Conclusion: According to the results, the ACT-based training intervention was effective in reducing the mean value of the virus, lowering stress, anxiety, and depression, and raising the social desirability of women with HPV. Therefore, the achieved findings could be beneficial not only for the infected women with HPV and their families but also for comprehensive health centers and counseling clinics.

Keywords: ACT-based training intervention, Anxiety, Depression, Human Papillomavirus, Mean of virus, Social desirability, Stress

Background

Human papillomavirus (HPV) is one of the most common sexually transmitted viruses [1-3]. In some cases, the HPV infection persists and creates warts or precancerous scar-like lesions [4]. In recent years, the prevalence of HPV infection has increased [5,6]. As reported by the World Health Organization, cervical cancer will bring about over 443,000 deaths worldwide by 2030 [7]. In a study performed by Bagherinia et al. (2023), the prevalence of HPV in suburban-dwelling women was reported at 14.6% [8]. In their meta-analysis, Sethi et al. (2021) reported the HPV infection prevalence among the indigenous populations (both men and women) at 34.2% [9]. Besides, the research conducted by Li et al. (2019) found the HPV infection rate in women living on the Chinese mainland at 19.0% [10]. The HPV infection matters since it is significantly associated with cervical cancer (the second most prevalent cancer in women), penile cancer in men, and anal cancer in both men and women [11, 12]. The HPV infection is also linked with physical disorders, like pain [13], itching, or bleeding [14] in addition to its induced physical problems [15]. The HPV infection comes along with anxiety, stress, depression, stigma, and fear of getting cancer [16]. Regarding the sexual transmission of HPV, shame, and stigma related to disclosing positive results to the partner, family, and friends; fear of judgment; negative beliefs about sexual restrictedness; self-blame; and sexual health-related concerns are commonly involved [17].

Moreover, patients with HPV, particularly women, may have to cope with daily life stress, disease-related complications, maternal duties, work obligations,

family life, communication, and social activities [18, 19]. The most significant components undergoing changes in such individuals are biological, psychological, and social indicators [20]. Consequently, the measures taken to promote health should focus on all these three aspects [21]. One of the effective and well-known measures to boost the biological and socio-psychological indicators is the ACT-based intervention, which has been popular since 1990 with the beginning of the third wave of Cognitive Behavioral Therapy [22, 23].

Objectives
As mentioned above, the HPV disease causes various problems and negative emotions, which highlights the importance of addressing biological and socio-psychological indicators to prevent negative emotions from interfering with the recovery process of the patients. In this regard, the present study aimed to assess the impact of the ACT-based program on the biological and socio-psychological indicators of women aged 35-65 years afflicted with HPV, in Dubai, United Arab Emirates.

Materials and Methods
Study design and Participants
The present quasi-experimental research was performed with pre-test and post-test design, including intervention and control groups. The statistical population of the study included the female HPV-infected patients (n = 30) who referred to Al-Shafa Behavioral Diseases Clinic in Dubai from January to February 2025 for their routine care. The study inclusion criteria were being between 35 and 65 years old, having an HPV infection confirmed by a physician, signing the consent form to participate in the research, not undergoing any psychological intervention during the study, and not having psychological disorders (as indicated by the interview performed by the physician of the center). The exclusion criteria were not receiving treatment for psychiatric disorders (e.g., anxiety or reduced resilience), being treated for other chronic and serious diseases (e.g., cardiovascular disorders, cancer, and blood pressure), alcohol and substance abuse, and missing more than two sessions of the intervention.

Sample size and Sampling method
In total, 30 participants were selected via purposive sampling from the women who referred to the Behavioral Diseases Clinic. The participants were randomly assigned to experimental and control groups.

Data collection Tools
The following tools were employed for collecting the required data and measuring the related variables in this research :

1. Depression, Anxiety, and Stress Scale-21 items (psychological indicator)
The Depression, Anxiety, and Stress Scale-21 items (DASS-21) was used for data collection. Its 21 items are divided into three subscales, namely anxiety, stress, and depression [20]. In Iran, Samani et al. (2007) examined the validity and reliability of the DASS-21, the reliability coefficients for depression, anxiety, and stress were 0.81, 0.78, and 0.80, respectively. Moreover, the total coefficient of the scale was reported at 0.82 [24].

2. Marlowe-Crowne Social Desirability Scale (social indicator)
The social desirability test scale was developed by Douglas P. Crowne and David Marlowe (1960) to measure the willingness of individuals to respond in a socially desirable manner. In their study, Sharaf al-Din (2010) applied Cronbach's alpha and split-half reliability methods to calculate the reliability of the above-mentioned scale, which were achieved at 0.70 and 0.67, respectively. They indicated acceptable coefficients. Regarding the validity of the scale, high and acceptable correlation was observed with other psychological tools designed to measure social desirability [25].

3. Examination of the virus presence in women (biological indicator)
The viral load reduction was determined by clinical an examination performed by a physician. During the pre-intervention stage, the intervention and control groups were examined by a physician who assessed the subjects about the presence of the mentioned virus. Afterward, at the post-intervention stage, they were re-examined and re-assessed for the presence of the virus.

Training Intervention
The ACT-based training program, compatible with the content of the ACT Training Protocol (Steven C. Hayes, 1980s), was implemented for two weeks for each intervention group. Table 1 illustrates the content of this program. Each 90-minute training session was held four times a week as a group at Al-Shafa Behavioral Clinic.

Table 1. Summary of Acceptance and Commitment Therapy-based training content (Hayes et al.1980s)

Sessions	Content
1st	Welcoming, establishing communication, and building familiarity with the group members. Explaining the group rules and the number of treatment sessions, and performing the pre-test during the first session
2nd	Expressing the necessity of psychological interventions, creating hope, waiting for treatment to reduce this pressure, expressing acceptance, recognition, feelings, and thoughts around problems, raising the awareness that thoughts are simply thoughts and feelings are simply feelings
3rd	Discussing the feelings and thoughts of the training group members, introducing the concept of accepting one's thoughts and feelings without prejudice, discussing the concept of emotion, and being aware of their differences in thoughts and feelings
4th and 5th	Providing feedback from the previous session, teaching mindfulness techniques and focusing on breathing, teaching the technique of being present at the moment or present moment awareness or mindfulness and how to stop thinking, providing assignments to look at life experiences differently and see the disease just as a disease and nothing more
6th and 7th	Reviewing the assignments of the previous session, examining the unresolved issues and ambiguities among the members, teaching the concept of value, identifying practical values in life, and making a commitment to act on them
8th	Providing feedback, reviewing assignments, revising and summarizing the materials, appreciating the members for attending the meetings, and administering the post-test

Data Collection Procedure

The ethical approval was obtained from the Ethics Committee of Iran National Committee for Ethics in Biomedical Research with the code IR.PNU.REC.1403.553. The necessary permissions were obtained from Al-Shafa Behavioral Diseases Clinic in Dubai. The participants were invited to join the study through verbal communication. Standardized questionnaires were distributed among the participants to complete. Each questionnaire required approximately 90 min, and the participants had five days to complete them.

Data Analysis

The data distribution normality was assessed by the Kolmogorov-Smirnov test. Moreover, the Chi-squared test was used to compare the intervention and control groups in terms of qualitative variables (such as marital status, smoking history, and medical history). The quantitative variables (like age and body mass index [BMI]) were analyzed by the Mann-Whitney U test. A repeated measures test was used to analyze the data, and the significance was considered 0.05 in all tests.

Results

Table 2 summarizes the demographic characteristics of the intervention and control groups. The Chi-squared test revealed no significant differences between the groups in terms of marital status (p = 0.799), smoking history (p = 0.425), and medical history (p = 0.822). Similarly, the Mann-Whitney U test displayed no critical differences between the groups regarding age (P = 0.345) and BMI (p = 0.641). These findings indicated demographic homogeneity between the two groups, which emphasizes the validity of the study results since any observed differences can be attributed to the intervention rather than baseline group differences. Table 3 tabulates the mean values of stress, anxiety, depression, and social desirability as well as the mean number of viruses in the affected women. According to Table 4, the effect of time on reducing the mean of virus in the ACT-oriented intervention group was significant (P=001). This indicates a significant difference between the intervention (the ACT-based program) and control groups regarding the average score of the virus at the pre-test, post-test, and follow-up. However, the interaction of the pre-test, post-test, and follow-up times (intervention and control groups) on the mean of the virus is not tangible. That is, the difference of the mean of the virus does not differ according to the variable levels of the groups (intervention and control groups) at the pre-test, post-test, and follow-up times.

As shown by Table 5, the effect of time on reducing the mean depression (p = 0.001), mean anxiety (p = 0.001), and mean stress (p=0.001) values in the ACT-focused intervention group was tangible, i.e., a significant difference existed between depression, stress, and anxiety scores at the pre-test, post-test, and follow-up stages in the intervention (the ACT-based program) and control groups. However, the interaction of pre-test, post-test, and follow-up times (with intervention and control groups) was not meaningful on the mean of depression, stress, and anxiety. This means that the mean difference of depression, stress, and anxiety did not differ according to the variable levels of the intervention and control group at the pre-test, post-test, and follow-up stages.

Table 2. Comparison of demographic characteristics of participants in intervention and control groups

Variable		Intervention Group (Mean ± SD or %)	Control Group (Mean ± SD or %)	p-value
Age (yrs.)		40.80 ± 4.69	40.20 ± 4.78	0.345
Body mass index		24.06 ± 1.64	24.72 ± 1.35	0.641
Marital Status	Single (%)	5 (33.33)	4 (66.26)	0.799
	Married (%)	10 (66.66)	11 (73.33)	
Smoking History	No (%)	9 (60)	10 (66.66)	0.425
	Yes (%)	6 (40)	5 (33.33)	
Medical History	No (%)	10 (66.66)	11 (73.33)	0.822
	Yes (%)	5 (33.33)	4 (66.26)	

Table 3. Mean ± standard deviation of variables of depression, anxiety and stress, social desirability, and virus by group

Variable	Pre-test		Post-test (immediately)		Follow-up (two months later)	
	Intervention group	Control group	Intervention group	Control group	Intervention group	Control group
Depression	24 ± 2.92	24.46 ± 1.72	14 ± 3.79	24.93 ± 1.33	10.33 ± 5.10	23.60 ± 2.09
Anxiety	20.66 ± 2.58	21.13 ± 1.72	14 ± 3.79	23.73 ± 2.78	11.06 ± 5.43	19.33 ± 5.87
Stress	23.86 ± 3.24	23.80 ± 1.37	14 ± 4.17	19.20 ± 4.73	11.46 ± 1.92	16.60 ± 3.31
Social desirability	17.60 ± 17.04	16.00 ± 11.34	27 ± 6.21	17.73 ± 15.44	27.40 ± 6.67	23.60 ± 9.65
Mean of virus	8.93 ± 1.38	8.20 ± 0.77	7.86 ± 0.63	8.93 ± 1.38	4.86 ± 0.91	7.1 ± 4.72

Table 4. A repeated measures test for identification of the effect of Acceptance and Commitment Therapy-based intervention on reducing the mean of virus in the two study groups (intervention and control)

Source	Variable	Sum of roots	Degree of freedom	Mean square	F	Significance	Eta squared	Test power
Time	Mean of virus	23.067	1	237.067	222.695	0.001	0.888	1
Group*Time	Mean of Virus	0.600	1	0.600	0.489	0.490	0.489	0.104

Table 5. A repeated measures test for identification of the impact of Acceptance and Commitment Therapy-focused intervention on reducing depression, stress, and anxiety in intervention and control groups

Source	Variable	Sum of Roots	Degrees of freedom	Mean square	F	Significance	Eta Squared	Test Power
Time	Depression	318.817	1	318.817	56.146	0.001	0.953	1
	Anxiety	858.817	1	858.817	88.843	0.001	0.760	1
	Stress	212.150	1	212.150	40.704	0.001	0.953	1
Time*Group	Depression	12.150	1	12.150	4.45	0.154	2.14	0.293
	Anxiety	62.017	1	62.017	6.41	0.347	0.186	0.868
	Stress	3.750	1	3.750	0.716	0.558	0.025	0.125

As summarized in Table 6, the results displayed a significant time-induced increase in the mean social desirability (p = 001) in the ACT intervention group. Specifically, a meaningful difference was observed between the ACT-based intervention and control groups in terms of the mean score of social desirability at the pre-test, post-test, and follow-up stages. Moreover, the effect of time points (pre-test, post-test, and follow-up) on social desirability was tangible in both intervention and control groups (p = 031). In other words, the mean social desirability scores differed across these time points for intervention group.

Table 6: A repeated measures test for measuring the impact of Acceptance and Commitment Therapy-based intervention on social desirability in intervention and control groups

Source	Variable	Sum of roots	Degrees of freedom	Mean square	F	Significance	Eta squared	Test power
Time	Social desirability	155.467	2	77.233	0.820	0.001	0.260	0.978
Time * Group	Social desirability	548.867	2	29.433	0.690	0.031	0.116	0.655

Discussion

The present study aimed to compare the effectiveness of the ACT-based therapeutic and mindfulness interventions on the biological and socio-psychological indicators of 35-65-year-old women with HPV infection. The results demonstrated that implementation of the ACT-oriented training sessions influenced the biological and socio-psychological indicators which led to a decrease in the mean of HPV; a decline in stress, anxiety, and depression; and an increase in the mean of social desirability among the HPV-infected women. In other words, the ACT-based training program was effective in the intervention group, compared to the control group.

The findings suggested that the ACT-based training intervention managed to reduce the mean

viral load in the infected women after a two-month follow-up. This finding is in line with those of the studies carried out by Shin et al. (2021), Vorster et al. (2022), and Jodry et al. (2023) [26-28]. In explaining this finding, it can be stated that the foundation of ACT training in the first stage is to accept or be willing to experience disturbing experiences without the desire to stop them. Therefore, the first step for the infected women is to accept their illness without the desire to control it. Afterward, in the second step, they start to act based on commitment and value.

In fact, this educational approach results in recognizing the sensitive situation of the patients, and the function of cognition and emotion change leads to better control over the disease. In this program, for example, if before the intervention the individual behaved in such a way that paved the ground for infection, during the training process, she learns to act based on commitment and to create healthy experiences by eliminating the unwanted ones.

Additionally, the ACT-oriented intervention reduced the mean anxiety, depression, and stress in the affected women. This finding was in line with those of the studies conducted by Diez-Martinez et al. (2024), Abdirasulovna et al. (2023), Vahabi et al. (2022), and Nissen et al. (2020) [29-32]. Other studies performed by Martinez et al. (2025) [33], Adegboyega et al. (2025) [34], and Jing et al. (2024) [35] have demonstrated that focusing on intervention in such women might improve their mental health. This finding suggests that in the ACT-based training intervention, the presence of diseases, such as HPV, followed by cervical cancer or genital warts can lead to a disturbed mental state for the sufferers, and this disturbed mental state imposes a lot of stress and anxiety on the patients and can affect all aspects of their lives.

The infected woman has problems in establishing relationships with her family, especially her partner, and this can also cause more mental confusion for her and lead to anxiety. Since this disease induces stress and anxiety, efforts were made to win the trust of patients during the ACT-based intervention and also to increase and reciprocate the mental acceptance of the patients regarding their mental experiences.

Besides, during this training process, the patient learned that any memories leading to a sense of control or avoiding unwanted mental experiences are completely ineffective and it is better to first accept the existing situation and bad memories, and in the second step, start to be psychologically aware. In this step, the patients learned that this disease could lead to stress, anxiety, and depression, and

that they should accept these conditions as all these emerging mental states (including anxiety, stress, and depression) are normal and it is necessary to embrace them.

In the third step, the patient was trained to distance herself from mental experiences as much as possible and replace them with positive experiences to be able to act independently out of disturbed mental experiences. In the fourth step, based on ACT, the patient was educated to focus on herself and her emotions. In case of undergoing an unpleasant feeling that caused her to suffer at the moment, she was required to concentrate on it and eliminate anything obsessing in her mind about the disease. For example, if the patient considered herself a victim, she was encouraged to let go of such a mental state and accept her illness.

In the fifth step, it was tried to teach the patients to start identifying their personal values and accept them step by step. Moreover, they were encouraged to put the values into action and turn them into specific behavioral goals. Finally, and in the last stage, an effort was made to teach the infected women to start motivating themselves and move committedly toward their goals and valued behavior.

Another finding of the present study was that the ACT-focused training intervention increased the mean of social desirability in the HPV-infected women. This finding is in agreement with those of the studies performed by Mardani et al. (2023), Shojaee et al. (2023), Hapenny et al. (2017), Ramezankhani et al. (2024), Alqethami et al. (2025), Duzova et al. (2024), and Almatrafi et al. (2024) [36-42]. This finding suggests that the ACT-focused training intervention consists of six stages, and in this study, the researcher tried to include all six stages in the program. For example, regarding social desirability, attempts were made to teach the HPV-infected women that the disease-induced disagreeable thoughts are separate from them and are only temporarily dominating them. In cases where the women thought that they were not being accepted by the community or family, an effort was made to train them that despite being currently exposed to a malady with some aspects of social stigma which could lead to non-acceptance, in reality, they should take such thoughts as temporary and disappearing.

In the second stage, regarding social desirability, efforts were made to educate the participants to accept unwanted feelings, senses, and desires imposed on them by society and not to make any attempt to change or escape them, or even stop paying attention to them again and allow themselves to reach self-acceptance. Afterward, in the next

stage, the infected women were taught to experience their illness by being fully aware, to accept the behavior of the community, and to stay focused and absolutely engaged in the community.

In general, the ACT-based program helped the HPV-infected women to develop a deeper awareness of their emotions, not interfere in their expression, and experience them comprehensively. In fact, the comprehensive experience of emotions through self-acceptance was carried out during the intervention so that the HPV-infected females were able to reduce the expression of emotions and rely on acceptance and commitment.

However, the present research faced some limitations, which include short-term follow-up for the evaluation of the effect of the implemented training program, small sample size, limited age group, and questionnaire-based data collection.

Conclusion

In conclusion, the results indicate that the ACT-based training intervention was effective on the infected women since it decreased the mean of the virus, reduced stress, anxiety, and depression, and raised social desirability. Given how critical role of health education in the promotion of some behaviors, such as stress reduction and enhanced social desirability, the need for broader training using various tools is felt more in society and should be regarded as one of the health priorities in society.

Compliance with ethical guidelines

The present paper is derived from a thesis

Authors' Contributions

SHNA, EKMN and AR conceived and designed the study. SHNA and AR collected and analyzed the data. EKMN, interpreted the data. All authors wrote the manuscript and prepared the tables. All authors revised the manuscript and approved the final manuscript.

Conflicts of Interest

The authors declare no competing interests.

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