YUVA: AN E-HEALTH MODEL FOR DEALING WITH PSYCHOLOGICAL ISSUES OF ADOLESCENTS

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ABSTRACT: The stressful lifestyle of the present age is leading to several psychological and behavioral issues. Adolescents and young adults are perhaps the worst effected due to the demanding everyday life leading to depression, anxiety and related issues. To deal with such issues the present study recommends an easy and adaptable electronic platform for e-psychology systems by using ICT tools and services and can be used to deal with various health (physical & mental) issues of adolescents. A model named "YUVA" based on RWD (responsive web development) which can run on any desktop or mobile phones is suggested for the benefit of adolescents trying to cope up with psychological issues. The purpose of this application is to provide information concerning different issues like health, education, recent studies, Government Initiatives etc. It incorporates several facilities like self assessment tests, registration facility for counsellors, dieticians, instructors etc. so that they can be contacted at the hour of need. The implementation is provided on .NET platform for wide deployment and adaptability.

Keywords:-Ehealth, psychological, adolescents, .NET, Responsive Web Development.

1. Introduction

The rise of the web technologies and growth of Information systems has touched all aspects of human lifestyle and improved quality of services in general. Our daily life is greatly influenced by advances made in communication systems and the health care is no exception. The use of Information & Communication Technology(ICT) tools and methods in the healthcare sector is one of the most rapidly evolving areas today. E-health is a new and efficient method for providing widespread and affordable health care services to large population E-health is being used more in the field of psychology and behavioral medicine to support a healthier way of life or track administration of medications to patients. The authors of [1] have coined the term e-psychology. It can be considered as a competent union of psychology and information & communication technology.E-psychology can provide services like diagnosis, valuation, counseling, administering psychological tests via use of ICTs.The effort is to improve E-health interventions with technology as an agent for to monitor compliance and behavior change. Focus is being towards the providing E-health services in case of depression, self-management,adjustments, anxiety disorders, etc. The use of E-health services can have profound effect in imparting services in dealing the psychological and other health issues.

This article throws light on a user-friendly, flexible and adaptive electronic platform, which supports e-psychology activities through the use of informative and communicative tools and services, which can be adapted to support various methods of e-psychology activities. The authors conclude that the utilization of tele-health interventions can be an effective way to solve the problems related to the psychological issues of adolescents. The present study throws light on the use of ICT in the psychological domain .A Responsive Web Application "YUVA" is designed for the Indian adolescents. The current scenario- statistics, need, problems etc. of adolescents in India is first analyzed. Based on that a model for the Responsive Web Application is designed which is having seven sections namely – What is adolescence, Needs & Problems, Find Support, Self-Assessment, Diet & Exercises, Government /NGO initiatives and list of pharmacies. In this the user can also perform an online self-assessment test. Support is also provided by linking the user to the counselor, dietician or instructor of that area, whose role is to provide training to the youth for proper exercises, the importance of biomechanics in this domain has also been analyzed. This application can be a helping guide for the children, parents as well as for the teachers. The implementation is provided on .NET framework.

Section 2 provides a literature review describing the contribution of IT in dealing with the different psychological issues and role of biomechanics in sports psychology, section 3 discusses the adolescent's issues in Indian scenario and suggest possible and effective solution by analyzing the present technologies responsible for the successful implementation of Ehealth services in India, Section 4 proposes a model or design of the responsive web application focusing the adolescent's problems in Indian Society and Section 5 concludes the chapter besides giving some future directions.

2. Literature Review

The present literature review provides studies related to contribution and significance of ICT in the psychological domain. Total 36 papers are selected for the review [Table 1].

Table 1. Literature Review

S.No.	Categories	References
1.	Behavioral and Mental Issues	[2-8]
2.	Anxiety Disorder and Depression	[9-22]
3.	Stress	[23-24]
4.	Psychosis	[25-27]
5.	Insomnia and Neuropsychology	[28-29]
6.	General significance and risk associated with e-psychology	[1;30-31]
7.	Self Motivation	[32-34]
8.	Adolescence Issues	[35-36]

Although the approach is to review the most relevant paper, it is possible that some important studies are missed. The numbers of papers are divided into the following 8 categories given below. The corresponding literature is given in the next sub sections.

- Behavioral and Mental Issues,
- Anxiety Disorder and Depression,
- Stress,
- Psychosis,
- Insomnia and Neuropsychology,
- General significance and risk associated with e-psychology.
- Self Motivation
- Adolescence Issues.

- ***Behavioral and Mental issues***

The authors of [2] address the behavioral and psychological interventions that use ICT in mental health outcomes. In [3] online services has been offered **to** the nurses and allied health professional targeting positive mental health.[4] describes the use of video teleconferencing in providing mental health care services including psychotherapy whereas [5] focuses on the online support group for mental health. References [6-7]discusses the role of internet for providing self help in dealing with the mental health problems and in [8] the authors have presented a base for the future research for designing the technology considering talk based mental health interventions.

- ***Anxiety Disorder and Depression***

In [9] online E-health application in providing the treatment of anxiety disorder has been discussed. The purpose of [10-19] is to use internet based therapy for depression .The authors of [20] discuss the benefits of telemedicine in solving the problems of depression. In [21] the authors have developed web based therapy for effective and efficient depression treatments in the diabetic patients whereas [22] explains the aspects like the utility, standards, performance and the future of computer-based treatment programs in mental health.

- ***Stress***

The authors of [23] developed an E-health program for self-management of stress related problems and in [24] authors throw light on the importance of internet offering new possibilities for the psychological treatment of posttraumatic stress disorder.

- *Psychosis*

In [25] potential and challenges of Internet and mobile-based technologies to improve psychosis evaluation and treatment has been discussed. The study in [26] reports a qualitative and quantitative analysis of the acceptability, usability and short term outcomes of Get Real, a web program in young people. The aims of [27] were to study and assess the evidence on the acceptability and safety parameters of mobile based as well as online systems for the patients suffering from psychosis.

- *Insomnia and Neuropsychology*

The article [28] presents new possibilities being offered through internet in improving insomnia. The study in [29] is dedicated to tele-mental health, the specialty of tele-neuropsychology, or neuropsychological evaluation through videoconferencing.

- *General significance and risk associated with e-psychology*

Authors in [1] propose a user-friendly, variable and adjustable online platform, supporting synchronous as well as asynchronous e-psychology actions. It uses ICT tools and services to manage different e-psychology systems and in **[Perle et al. 2013]** there is a discussion regarding the acceptance of online tele-health in the field of clinical psychology.

The chapter [30] covers some of the legal and risk elimination strategies in present mental health systems using online tools. It focuses on malpractice, security and privacy management.

- *Motivation*

The aim of the study in [31] is to examine teachers' motivation in applying ICT in learning and teaching. In [32] the authors offer a social perspective in the study of e-learning in the domain of social motivation. There is an attempt to identify social motivations that underlie learners' attitudes and usage behavior of ICT interactive tools.

The study [33] investigates the relation between the Self-Determination Theory of Motivation and the Unified Theory of Acceptance and Use of Technology (UTAUT) Model and confirms significant relationship across the two theories.

- *Adolescence Issues*

The study in [34] emphasizes that ICT has evolved rapidly in the last two decades but still there is a dearth of research on the issues linked to adolescents' use of ICT for social interaction. It draws data from the 2013 International Computer and Information Literacy Study (ICILS) database and employs three-level hierarchical linear modeling (HLM) as an analytic strategy, examined the predictive effects of ICT-related behavioral and motivational characteristics on the frequency of use of ICT for social communication among 56209 early adolescents from 3132 schools in 20 ICLIS participating countries.

In [35] the authors have examined the effect of a 12- week intervention program based on motivation in the physical education lessons to the female adolescents. The use of ICT has been promoted in encouraging the students to exercise in their leisure time.

3. **Adolescence: Indian Context**

In this section the emphasis is on the physiological issues associated with adolescents. WHO defines 'adolescents ' as age spanning 10 to 19 yr. It is considered as a period of transition from childhood to adulthood. Adolescents all over the world experience different problems like psychological, social, educational, morphological etc. In India too these problems are remarkable. According to [*www.censusindia.gov.in/2011. Population*]every fifth person in India is an adolescent (10-19 years).TheTable 2 provides the details of the population of adolescents in three different countries-India, China and USA.

Table 2 Population of Adolescents

Country	Population (in millions)	Adolescent (10-19 yrs.) Population (in million)	Proportion of Adolescents (%)
China	1358.8	191.2	14.1
India	1205.6	236.5	19.6
USA	312.2	43.0	13.8
World	6916	1198	17.3

(Source: www.censusindia.gov.in)

The data shows that around 20 % of the world's adolescents population reside in India . The state Uttar Pradesh has the highest no (19.3% of total population). 72%(181 million) of the total adolescents in India reside in rural areas. According to the report by UNICEF[*http://www.deccanherald.com/content/141057/condition-adolescents-india-among-worst.html.*] India does not have a good system in place to provide information regarding health related education issues for adolescents. Following are some data describing the condition of adolescents in Indian society[*www.censusindia.gov.in/2011...Population*].

- *Health:-*
  - Almost 47 % of girls (11-19 age) are underweight in India which is considered as the highest in the world.
  - 56% girls and 30% boys of this age group are anemic.
  - Student suicide rate in India has increased by a staggering 26.5% between 2012 and 2013 and the southern states of Maharashtra, Tamil Nadu, AP, Telangana, & Karnataka account to more than 45% of student suicides in India. A study by NIMHANS reveals that 20% of students suffered from subclinical depression while 30% suffered from mild to moderate depression.
- *Education:-*
  - About 40 % of this age group is out of school.
  - The percentage of school going children in the age group of 11-13 is 86% and in the age group 14-17 is 64%.
- *Early Marriage*
  - 43% of the girls are married before 18 years of age and approximately 13% become mothers before attaining an age of 18 years.
  - Deaths due to maternal disorders (excluding abortion) are about 6% of all deaths in 15-19 years old girls.
  - Abortion related deaths is around 1.6% of all deaths to 15-19 year old girls.
  - Around 6000 adolescent's mothers die every year.
- *General Awareness*
  - HIV/AIDS in adolescents in 35% in boys and 28% in girls.
  - Only 49% know about contraceptives.

Adolescents in India are facing many problems. There is an urgent need for educating adolescents on the different issues primarily the ones related to health. The problems of adolescents are multidimensional in nature and require holistic approach. According to the above data it can be estimated that a large number of adolescents in India are either out of school or mal-nutritional or get married early and they don't even have general awareness regarding the diseases like HIV and AIDS. The adolescents period may become a difficult phase of life due to lack of relevant guidance and support. Family and school teachers play an important role in moulding the behavior of adolescents and therefore they need to be educated first regarding the issues related to this age group. It is imperative that safe and enabling environment is provided to develop capacities to shape their future as well as that of nation. In India, Government as well as many NGO's have taken several initiatives for dealing with the different issues(health, educational, legal, etc.) of adolescents. The need of the hour is to make the people aware of the different services available and spreading awareness regarding the issues like

- Adolescents Health problems
- Nutritional Counseling
- Initiatives taken by Government/NGO
- Health centers
- General awareness regarding HIV/AIDS etc.
- Counseling for emotional stress.

4   Responsive Web Design

The literature review in section 2, shows that the proper use of ICT in behavioral and mental issues has been a welcoming trend. As the penetration of smart phones and mobile devices rises, the people find their flexibility in accessing information more useful. As there are multitude of devices, using correct interface according to individual device, is vital to the use of Responsive Web Design (RWD). It facilitates creating sites to provide an ideal viewing with simple reading and navigation without the need of resizing, panning and scrolling for different devices ranging from standard desktop monitors to small mobile phone screens.

Responsive design has become an essential part of web design. This technique provides users with instinctive and easy-to-use website for all types the mobile devices. The usage of hand held devices in addition to traditional laptops

and desktops is increasing rapidly. According to IAMAI (Indian & Mobile association of India), users accessing the internet via hand held mobile devices, is expected to cross 236 million by 2016(Fig. 1).
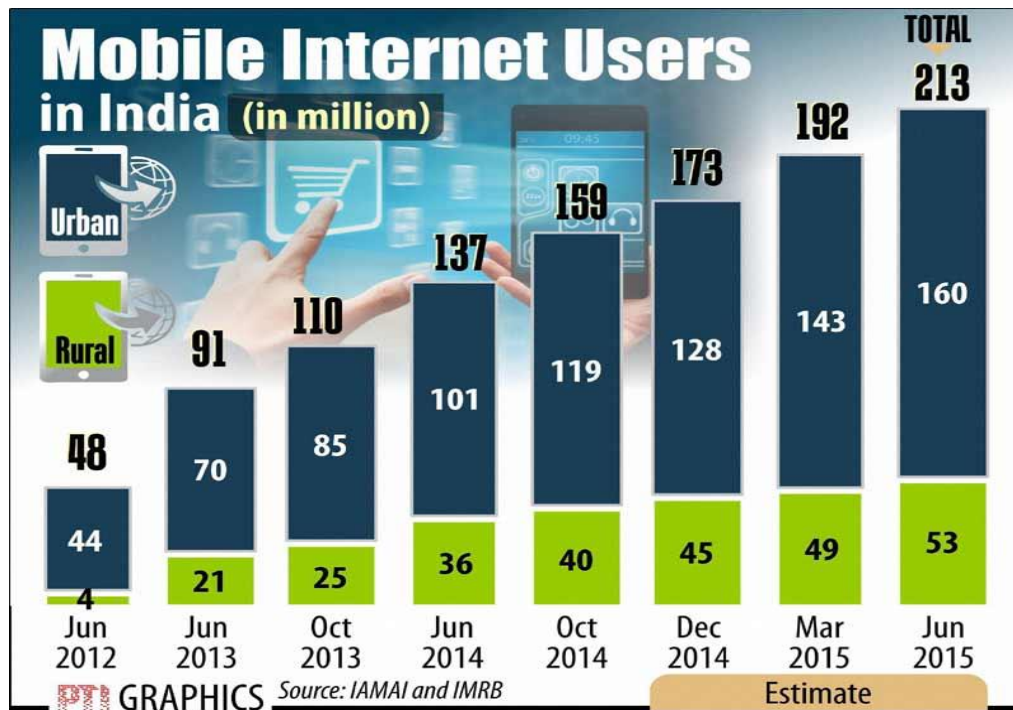

Fig. 1 Statistics of Mobile Internet Users

The present study focus on the development of a model based on RWD for the adolescents of India. In the current scenario applications specifically for adolescents is still an area to focus on. The present work provides a guideline on E-health web application for adolescents self care management.

Major Websites and mobile Apps dealing with the issues of adolescents in India are:

➢ Adolescent Health Academy:- Describes the ongoing events and future initiatives for the adolescents.*(http://ahaiap.org/)*
➢ YHP:- Shares regarding the youth health programmes. (*http://www.younghealthprogrammeyhp.com/home*).
➢ UNICEF India: The websites provides information regarding the initiatives being taken to help the adolescents in India*. (http://unicef.in).*
➢ Lantern Mobile app:- deals with the mental health issues of youths. There is an application named "Lantern" for seeking a counsellor's help to deal with the psychological problems like anxiety and stress among students. It has been introduced on trial-basis in two colleges in Hyderabad, India. An online assessment is conducted which checks the user on his or her worries, moods, thoughts, eating and sleeping habits. Later, a 15-minute phone call with a therapist is arranged who discusses the mental ailment in detail. The licensed mentor helps the user build better connection between his thoughts and actions. For example, someone who is quiet anxious might be directed to practice deep relaxation techniques or progressive muscle relaxation or likewise.[*http://www.indiatvnews.com*].

The present study throws light on the development of a model based on RWD - "YUVA" which can run on any desktop or mobile phones and is specifically designed for the adolescents in India. The next section explains the methodology and issues for this application "YUVA" for spreading awareness among the people regarding the need, problems, initiatives, contacting the counselors, Dietician, Instructor or providing tests for the self assessment.

5   Methodology
The methodology followed here is waterfall model which includes the steps feasibility study, requirement analysis and specification, Designing, Implementation, Testing and Maintenance.

5.1   *Purpose*
"YUVA" is a web application which provides services to the adolescents of Indian society regarding their different issues (health, education, recent study, Government initiatives etc.). The users can get connected to this application

through internet (desktop/mobile) and can approach nearby counselor or adolescents health centers. The responsive web design makes the navigation easier with mobile also.

5.2   *Scope*

This application provides facility to the different users(general user(teenager),counselor, dietician ,instructor and administrator).The user can get different information regarding the needs or problems of the adolescents and can undergo psychological tests for the self assessment. The counselor, dietician and the instructor can register themselves so that they can be contacted by the general user in need. This application shall be a great help in dealing with the rising problems of adolescents. The model mainly focus on establishing a small E-health application for the adolescents providing a common model that can be used by E-health application in future.

5.3   *Overview*

- *Existing System*

The websites for adolescents have discussion forum and the initiatives (recent, upcoming & past) taken by the government and the private organisation in India. The mobile app "lantern" connects the user to the counsellor and can interact with fifteen minutes for dealing the mental ailments.

- *Drawbacks*

Accessing websites from the mobile is not easy. Online self-assessment test are not easily accessible. Remote area users who don't have desktop face problem in accessing the services.

- ***Proposed System***
  - Registration of user, counsellor, dietician and instructor (for exercises) on a single platform.
    - The counsellor/dietician/instructor can register himself/ herself and the user can contact them in taking the guidance.
    - Sports is a very important activity for an adolescent. A trained instructor in biomechanics can guide the user for performing specific exercises while performing the sport activity.
  - The user can get information regarding needs and problems, government/NGO initiatives, Indian statistics, list of pharmacies and important phone numbers.
  - Psychological test for the self-assessment and calculation of the scoring is available.
  - User can take/cancel appointment from the counsellor, dietician and the instructor available in their/ other city.He can also provide the feedback of the councillor/ instructor/ dietician to the administrator.

5.4   *Overall Description*

This model is based on responsive web design and aims at easy navigation from all kinds of platform. It imparts knowledge regarding the different issues of adolescents of India. Besides this the user can also undergo self assessment tests and can contact the counselor, dietician and instructor in need.

5.5   *H/W and S/W Requirements*

- Client on Internet- chrome, IE, Operating system (Windows 7).
- Web Server- IIS, Operating system (Windows 7).
- Database Server- SQL server 2008
- Development End-ASP.NET, C#, JAVAScript, HTML
- Hardware Interface: Client Side: 4GB RAM, 80 GB hard disk
- Communications Interface- HTTP/ HTTPS.

5.6   *Constraints*

- GUI is only in English.
- Login and password is used for the identification of users.
- The registered users can contact only registered counsellors, dietician and instructor.
- The registration of counsellor/dietician/instructor is confirmed with subject to authentication from the administrator.
- For undergoing self-assessment tests registration is must.

5.7   *Design and Implementation*

This section will present the Entity Relationship diagram for the proposed system. The different entities, attributes and their relationship is depicted in the Fig. 2.
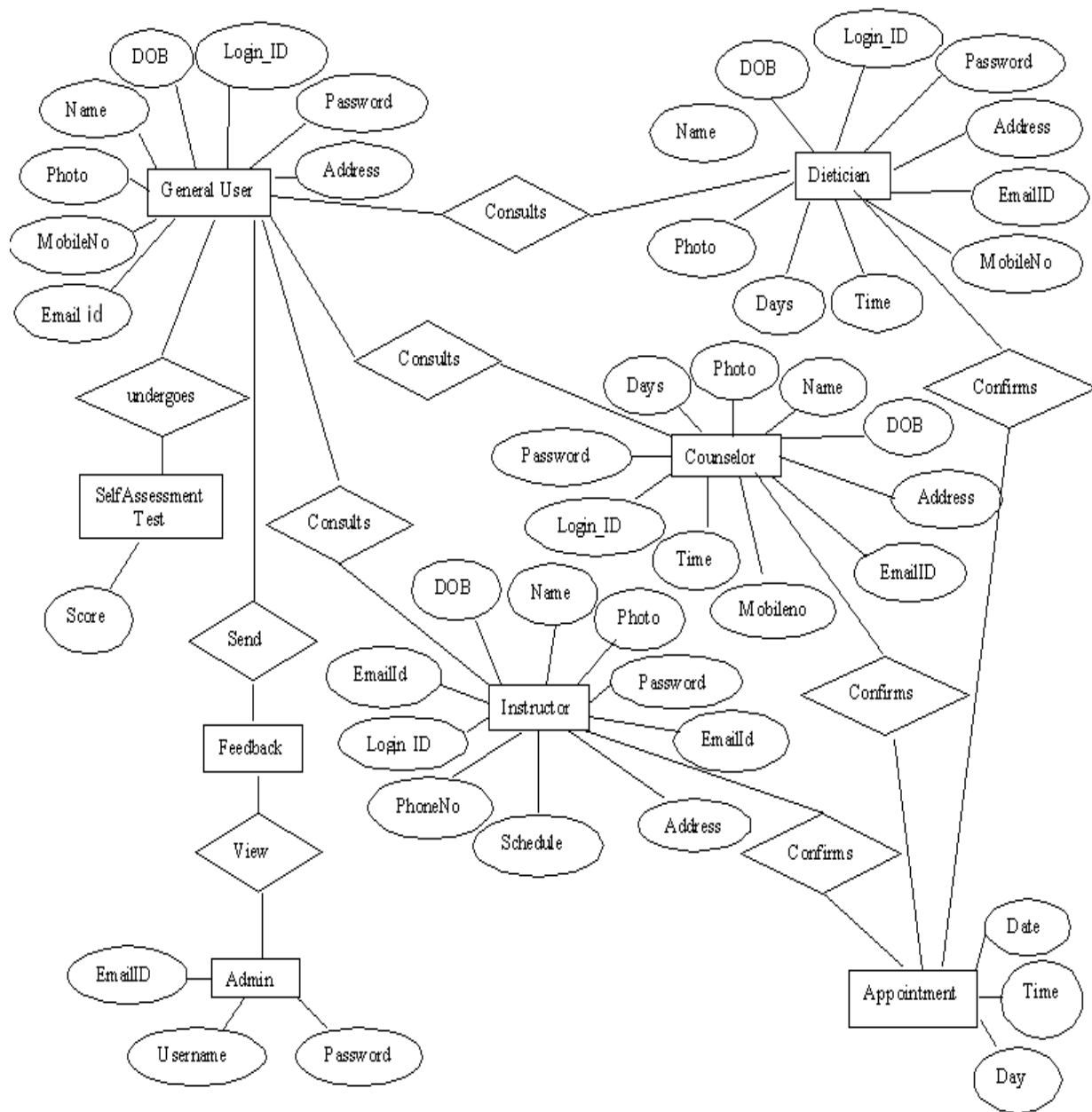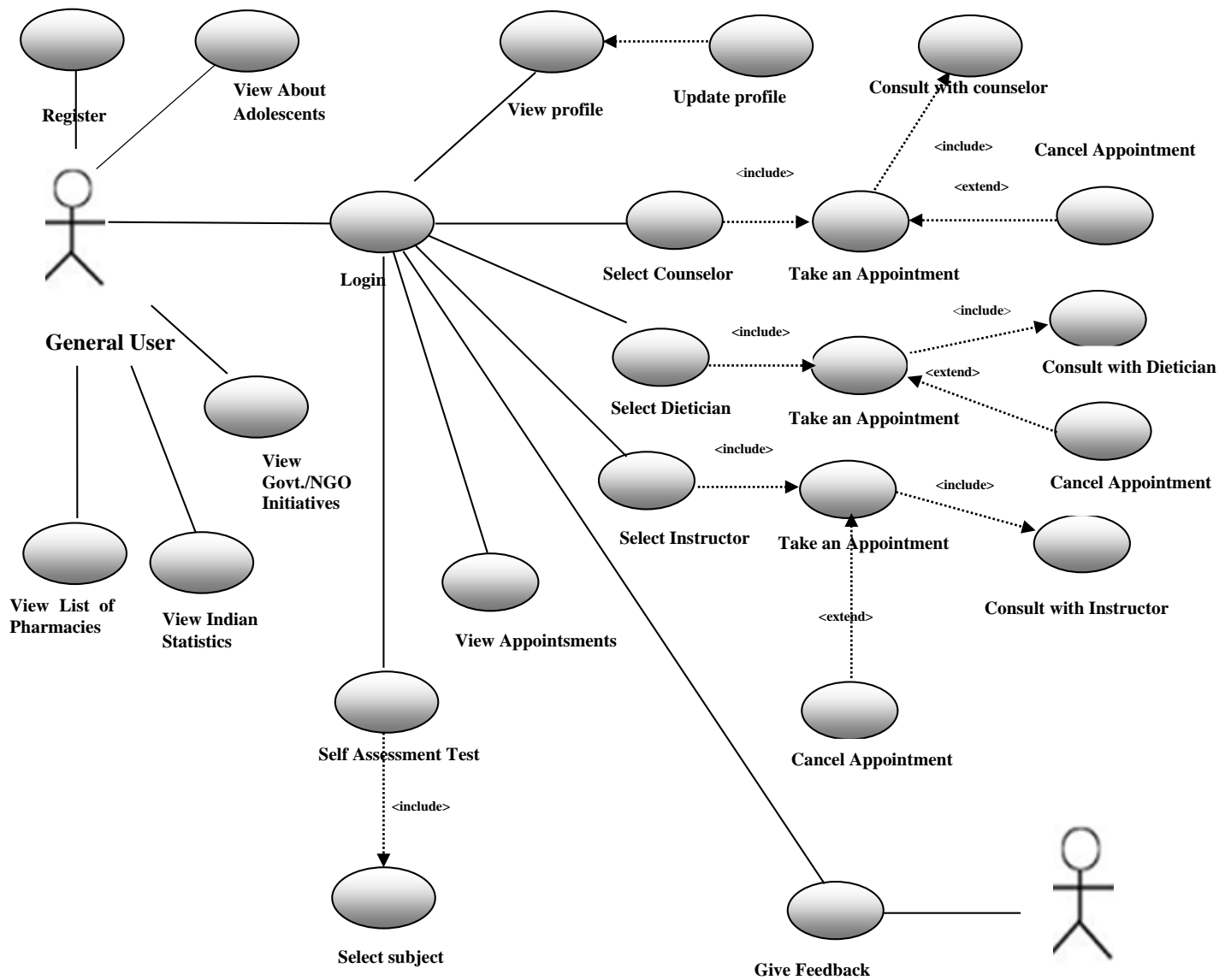
Fig. 2 ER Diagram

5.8 *Use Case Designs*
The different Use case designs are presented in the Fig. 3, Fig.4, Fig. 5, Fig.6 and Fig.7.
- Use case diagram for General User(Fig. 3)

Register

View About Adolescents

General User

View Govt./NGO Initiatives

View List of Pharmacies

View Indian Statistics

Self Assessment Test

<include>

Select subject

Login

View profile

Update profile

Consult with counselor

<include>

Cancel Appointment

<include>

<extend>

Select Counselor

Take an Appointment

<include>

Select Dietician

Take an Appointment

<include>

<extend>

Consult with Dietician

Cancel Appointment

<include>

Select Instructor

Take an Appointment

<include>

<extend>

Consult with Instructor

Cancel Appointment

View Appointsments

Give Feedback

Fig 3 Use Case Diagram for General User

Table 3 Use Case for General User and their Description

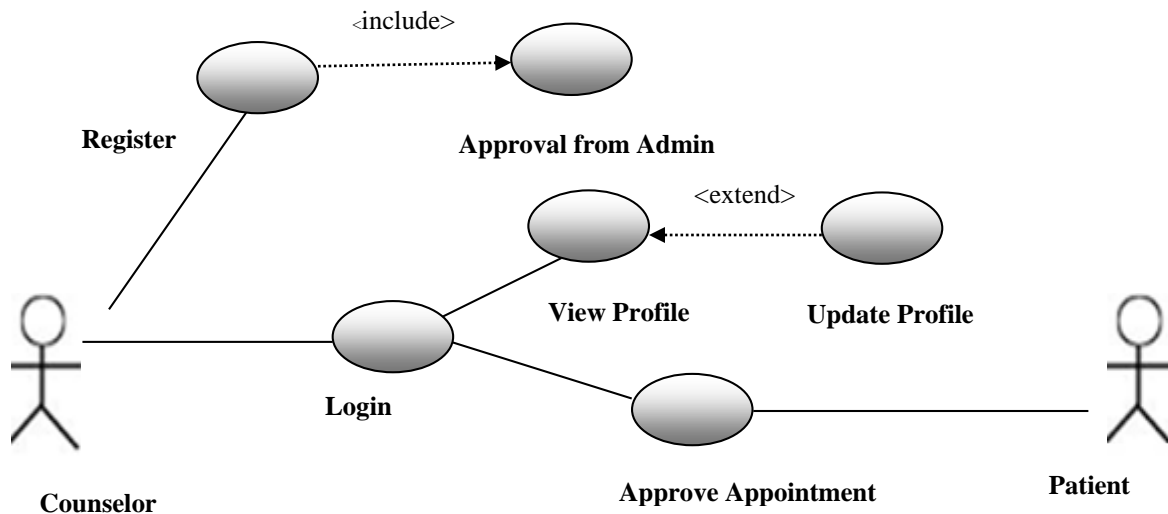| Use Case	Description
Register	The general user has to register.
View Profile	Every registered users have his/her own profile containing personal details.
Update Profile	The patient has the option to update his/ her profile
Select Counselor	The general user can select the counselor according to the city.
Select Dietician	The general user can select the dietician according to the city.
Select Instructor	The general User can select the instructor according to the city.
Take an appointment	Appointment can be taken by the general user according to the date and time mentioned.
Cancel Appointment	Appointment can be cancelled by the user.
Send Feedback	The user can send the feedback of counselor/instructor/ dietician to the administrator.
View About Adolescents	The user can view the link About Adolescents
View Government /NGO Initiatives	The user can view the initiatives done by the Government and the NGOs.
View List of Pharmacies	The user can view the list of pharmacies.
View Indian Statistics	The user can view the Indian Statistics regarding the adolescents.

- Use Case Diagram for Counselor(Fig. 4)

Fig. 4 Use Case Diagram for Counselor

Use Case	Description
Sign In	The counsellor has to sign in to enter in the system.
View profile	The registered counsellor has his own profile containing personal and professional details.
Update Profile	The counsellor has the option to update his/her profile.
View Appointments	The counsellor can view his/ her upcoming as well as past appointments.
Cancel Appointments	The counsellor can cancel his/ her upcoming appointments.

- Use Case Diagram for Dietician(Fig. 5)
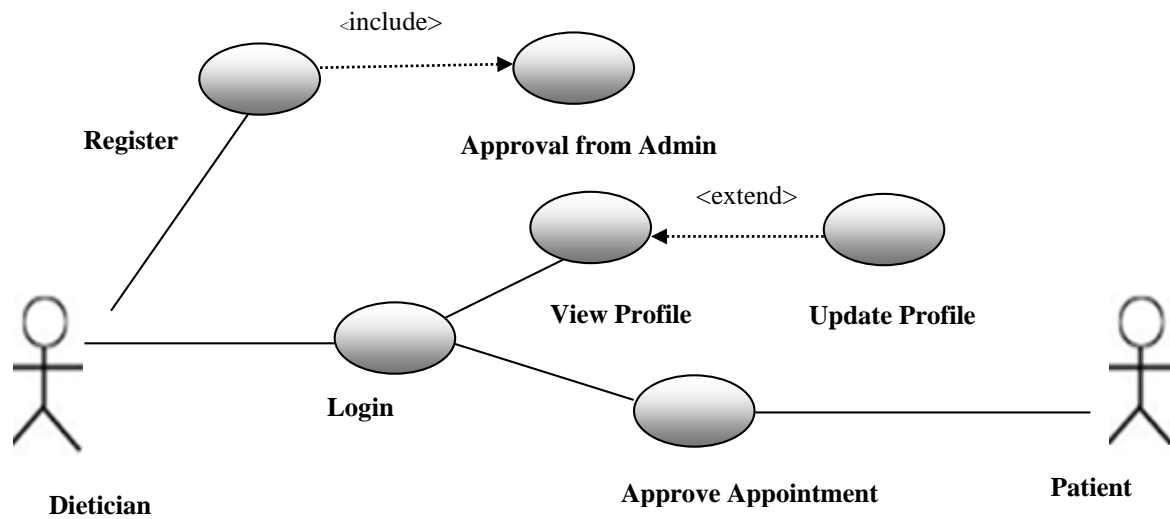
Fig. 5 Use Case Diagram for Dietician

The Table 5 provides the description of the Use cases for the dietician.

Table 5 Use Case for Dietician and Their Description

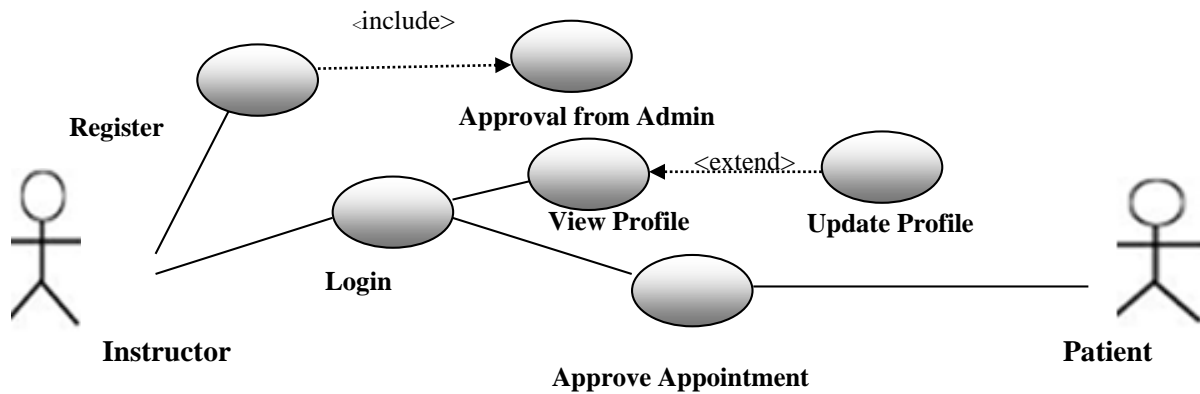| Use Case	Description
Sign In	The dietician has to sign in to enter in the system.
View profile	The registered dietician has his own profile containing personal and professional details.
Update Profile	The dietician has the option to update his/her profile.
View Appointments	The dietician can view his/ her upcoming as well as past appointments.
Cancel Appointments	The dietician can cancel his/ her upcoming appointments.

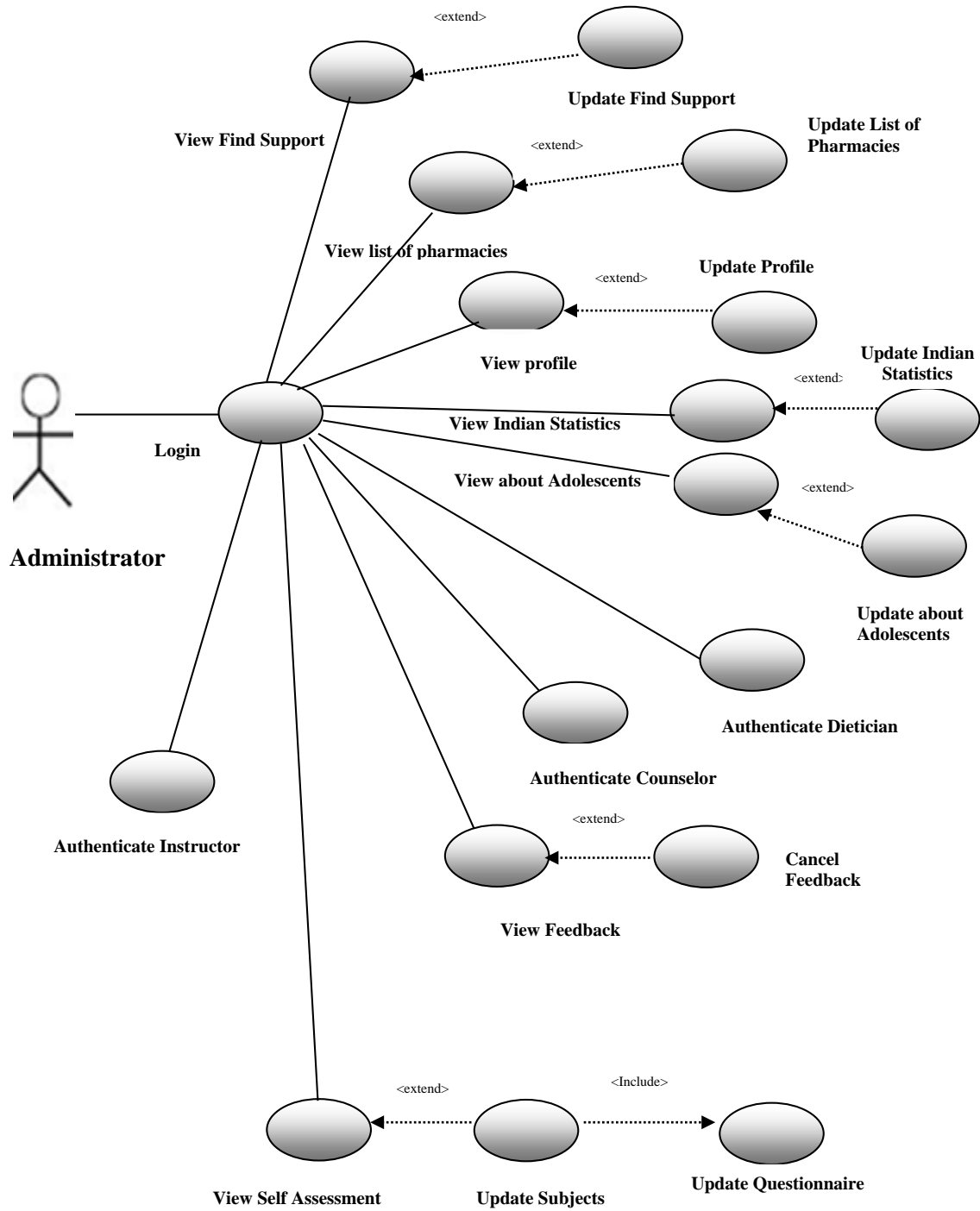- Use Case Diagram for Instructor(Fig. 6)

Fig. 6 Use Case Diagram for Instructor

Use Case	Description
Sign In	The Instructor has to sign in to enter in the system.
View profile	The registered Instructor has his own profile containing personal and professional details.
Update Profile	The Instructor has the option to update his/her profile.
View Appointments	The Instructor can view his/ her upcoming as well as past appointments.
Cancel Appointments	The Instructor can cancel his/ her upcoming appointments.

- Use Case Diagram For Administrator(Fig.7)

View Find Support

<extend>

Update Find Support

Update List of Pharmacies

<extend>

View list of pharmacies

Update Profile

<extend>

View profile

Update Indian Statistics

<extend>

View Indian Statistics

View about Adolescents

<extend>

Login

Administrator

Update about Adolescents

Authenticate Dietician

Authenticate Counselor

Authenticate Instructor

<extend>

Cancel Feedback

View Feedback

<extend>

<Include>

View Self Assessment

Update Subjects

Update Questionnaire

Fig. 7 Use Case Diagram for Administrator

Table 7 Use Case for Administrator and their Description

Use Case	Description
Sign In	The Administrator has to sign in to start its work.
Change password	The Administrator can change his/ her password.
Authenticate Counsellor	The Administrator has the right to approve the administrator.
Authenticate Instructor	The Administrator has the right to approve the Instructor.
Authenticate Dietician	The Administrator has the right to approve the dietician.
View Feedback	The Administrator can view the Feedback given by the general user.
Delete Feedback	The Administrator can delete the Feedback.
View About Adolescents	The Administrator can view/edit the link 'About Adolescents'.
View Indian Statistics	The Administrator can view/edit the link 'Indian Statistics'.
View List of Pharmacies	The Administrator can view/edit the link 'List of Pharmacies'.
View Find Support	The Administrator can view/edit the link 'Find Support'.

5.9   *Activity Diagrams*
This section will illustrate the different activity diagrams applicable for the proposed system
- User Registration Activity(Fig. 8)
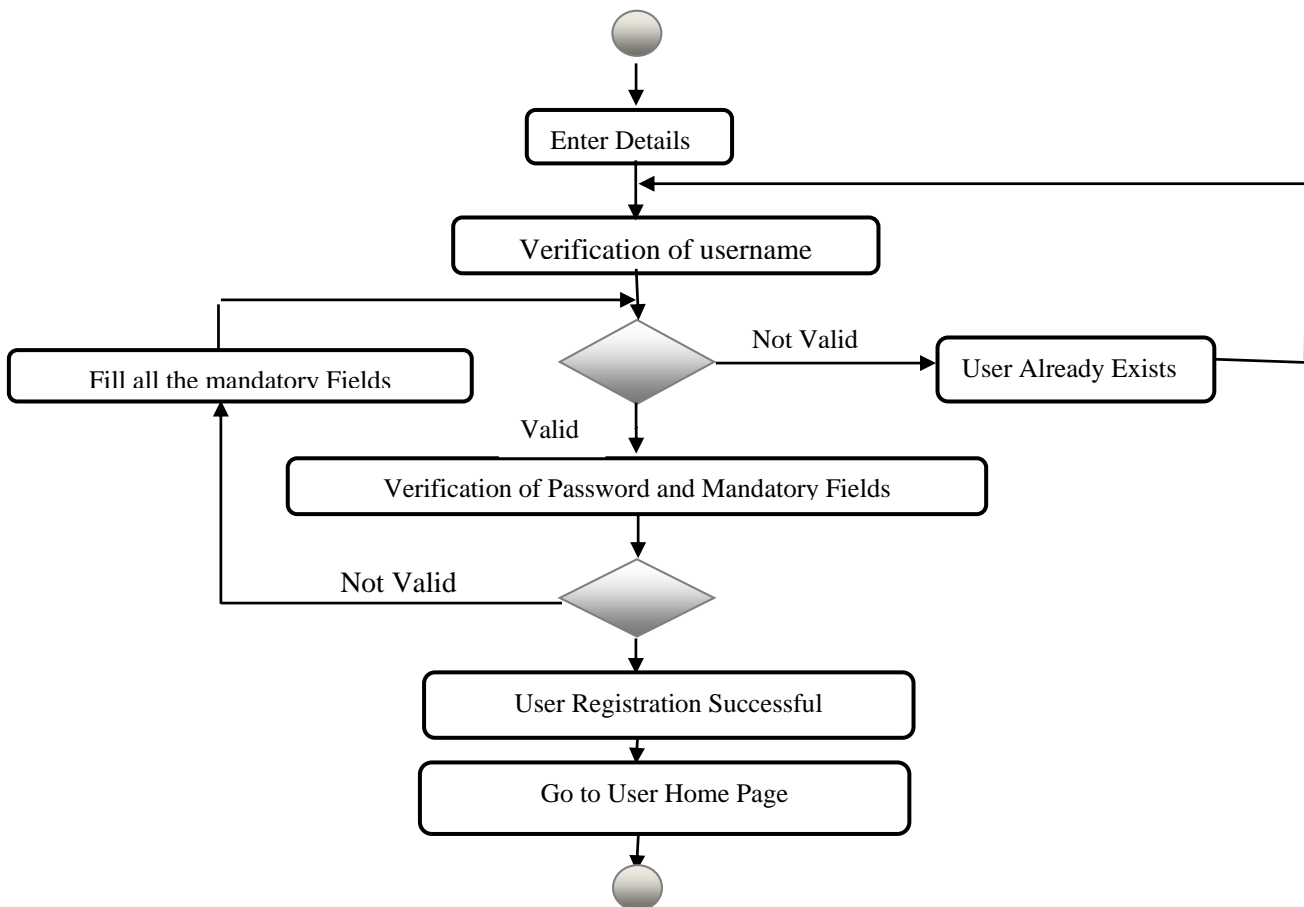
Fig. 8 Activity Diagram for User Registration

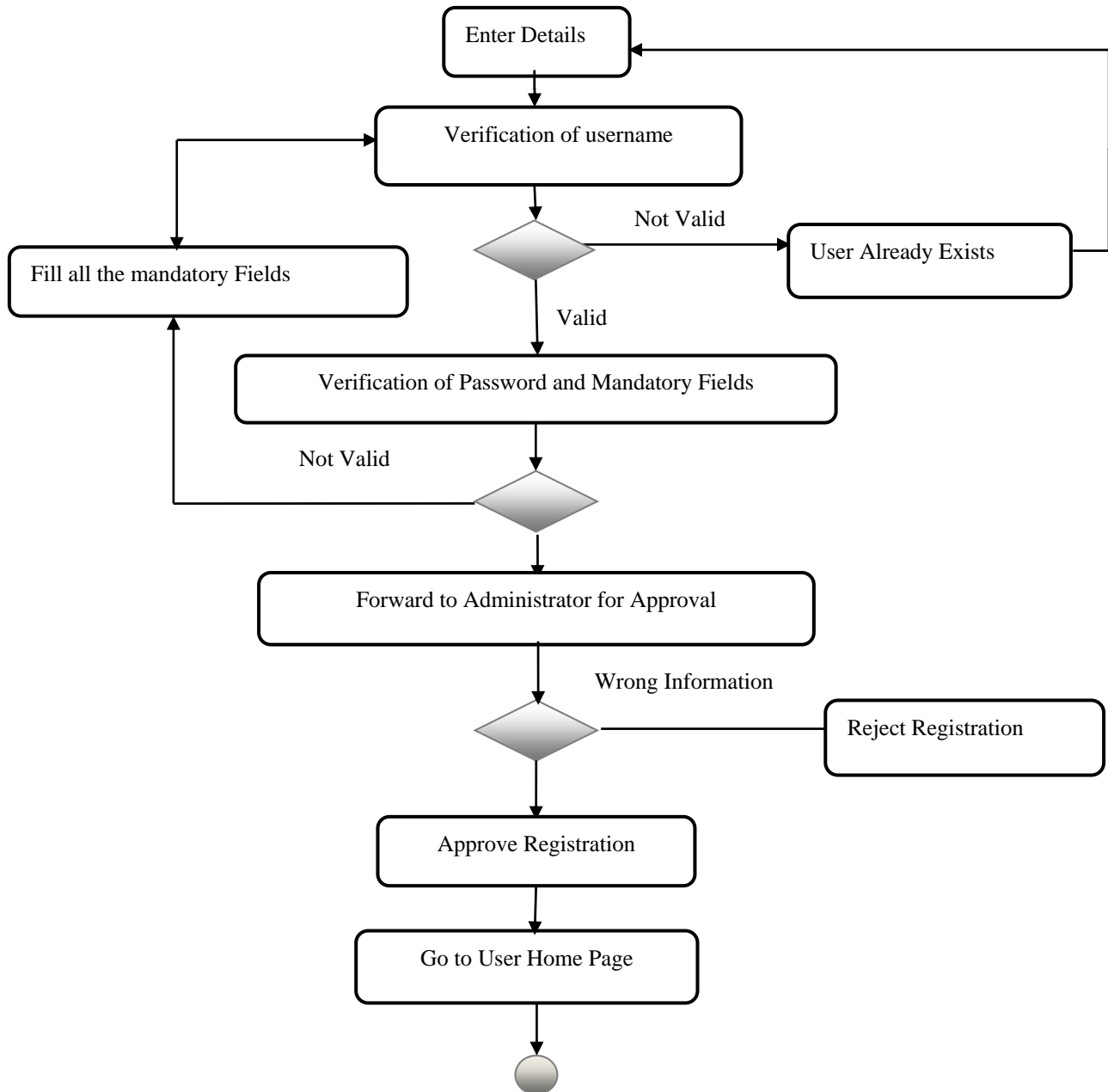- Activity Diagram for Counsellor, Dietician and Instructor Registration(Fig.9)

Fig. 9 Activity Diagram for Counselor, Dietician & Instructor Registration
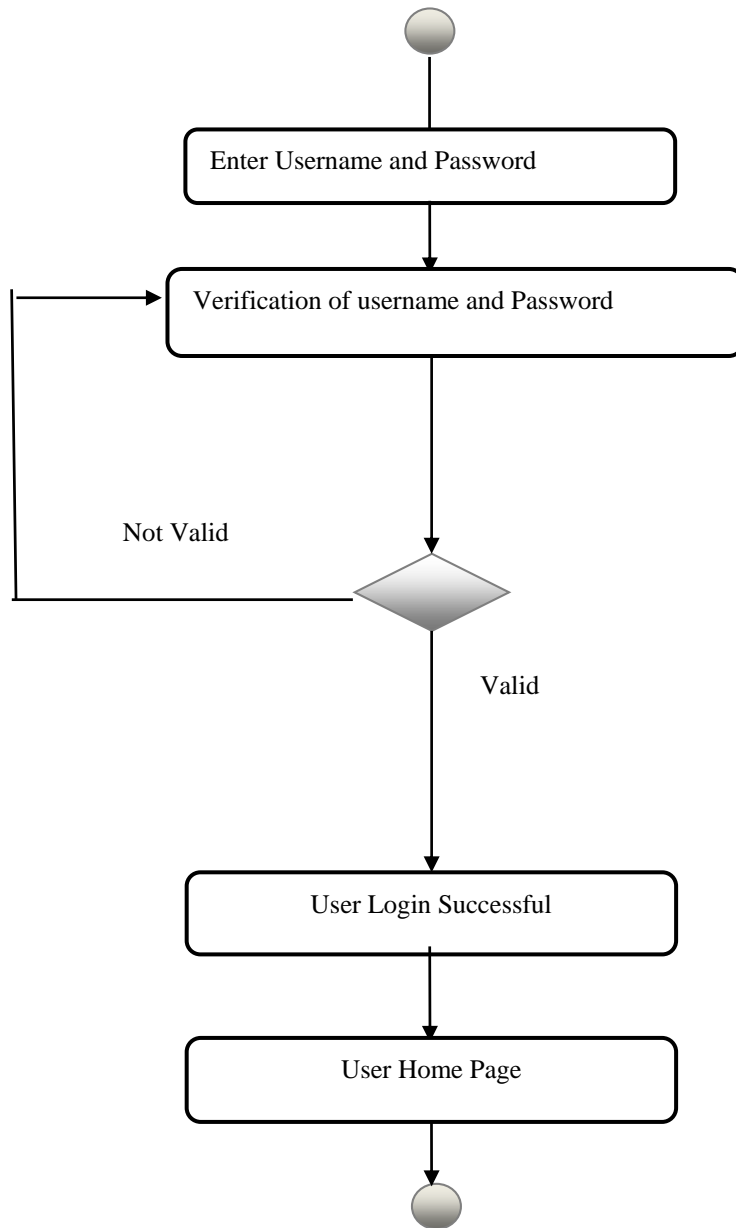
- Activity Diagram for User Login(Fig. 4.10)

Fig.10 Activity Diagram representing User Login

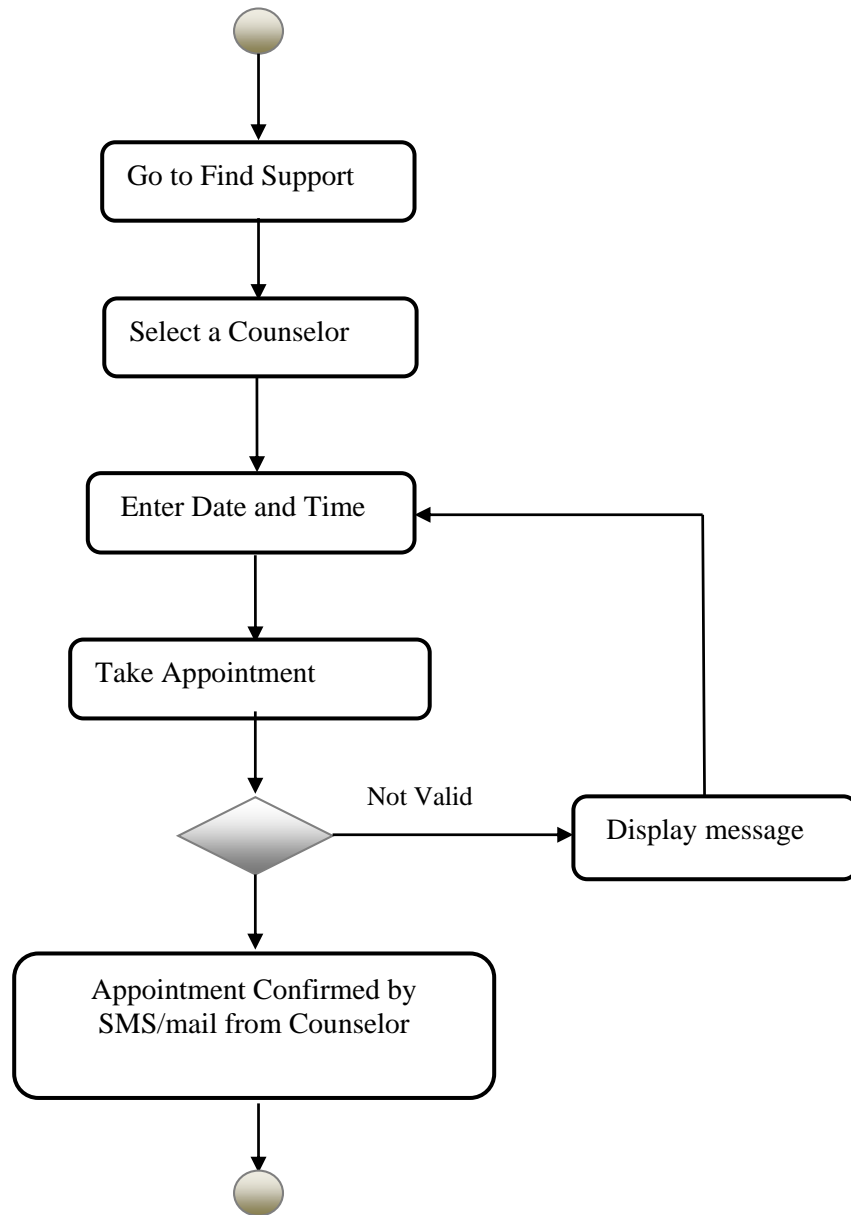- Activity Diagram for Taking Appointment(Fig. 11)

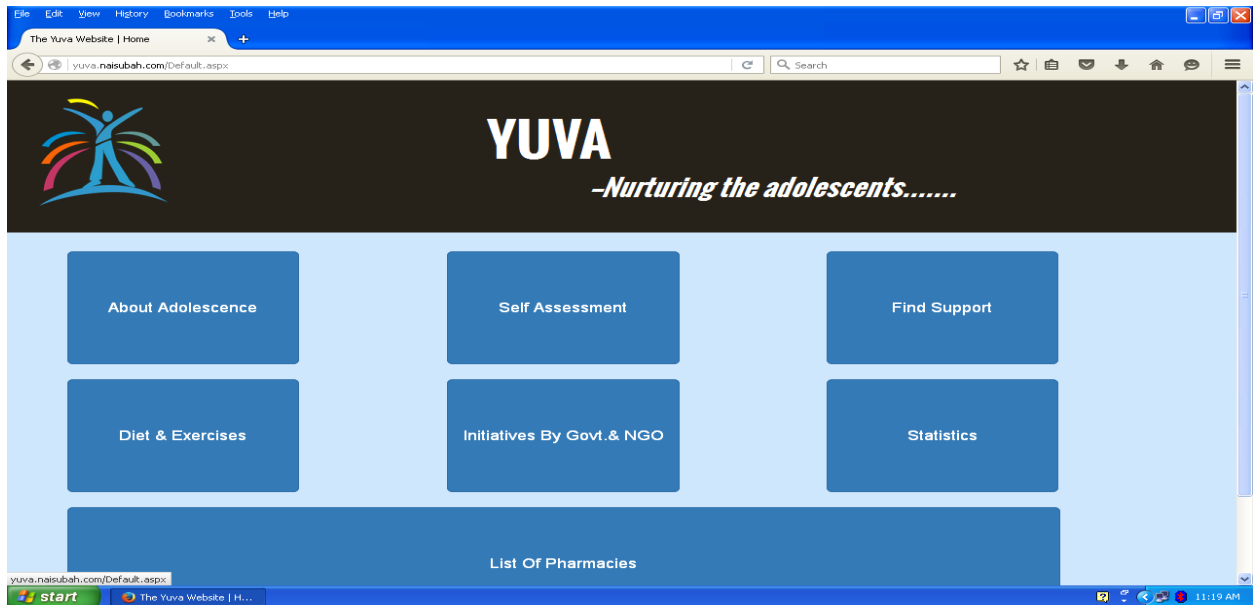Fig. 11 Activity Diagram for Taking Appointment

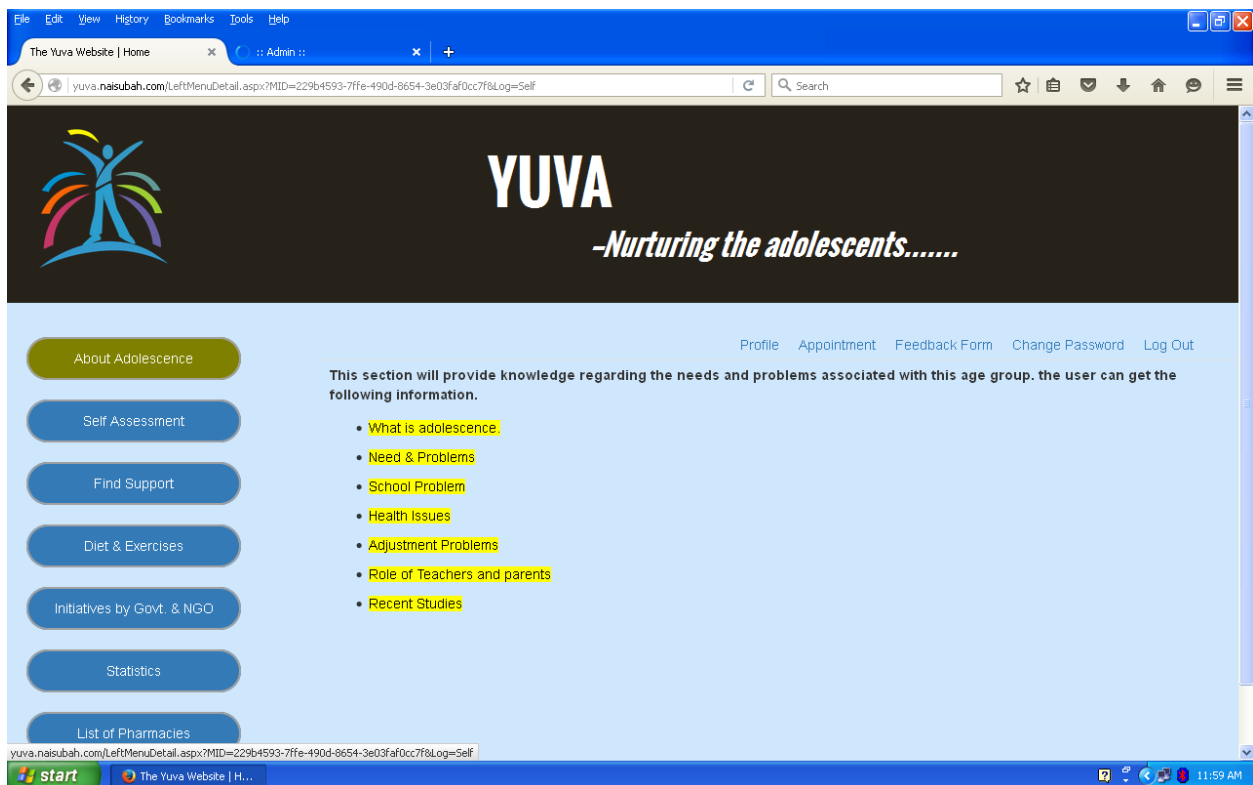**5.10   Output Screens**

Fig. 12 Home Screen
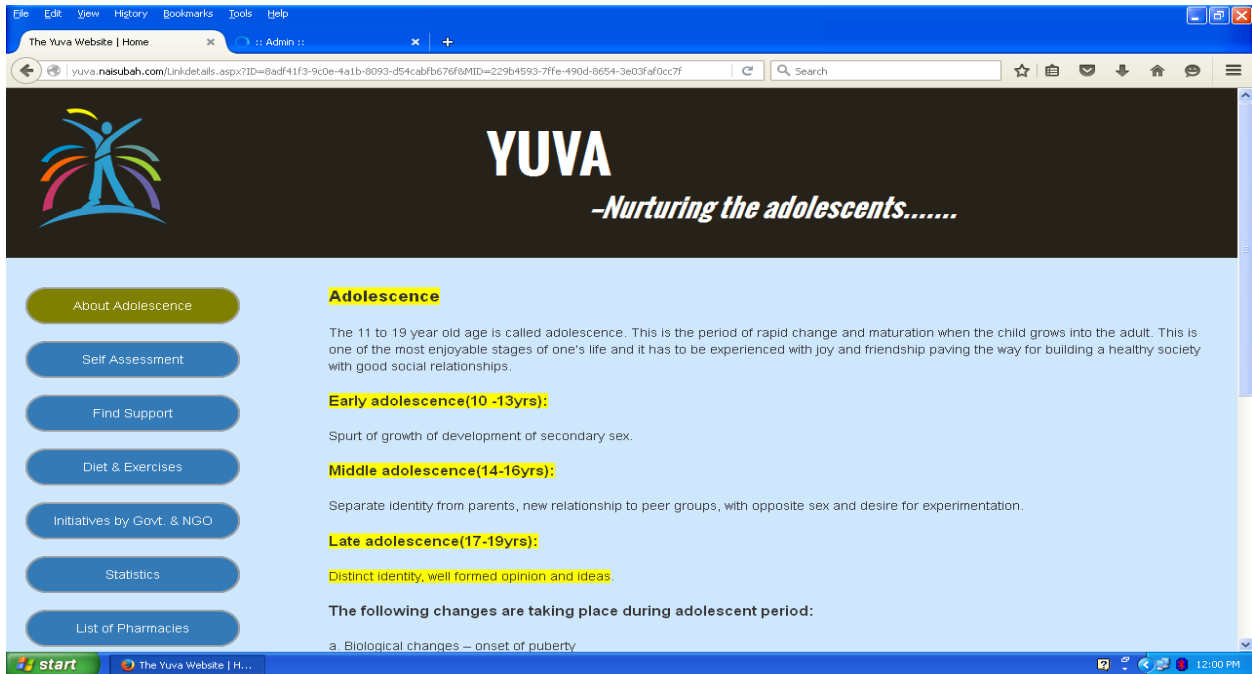

Fig. 13Viewing the link 'About Adolescence'

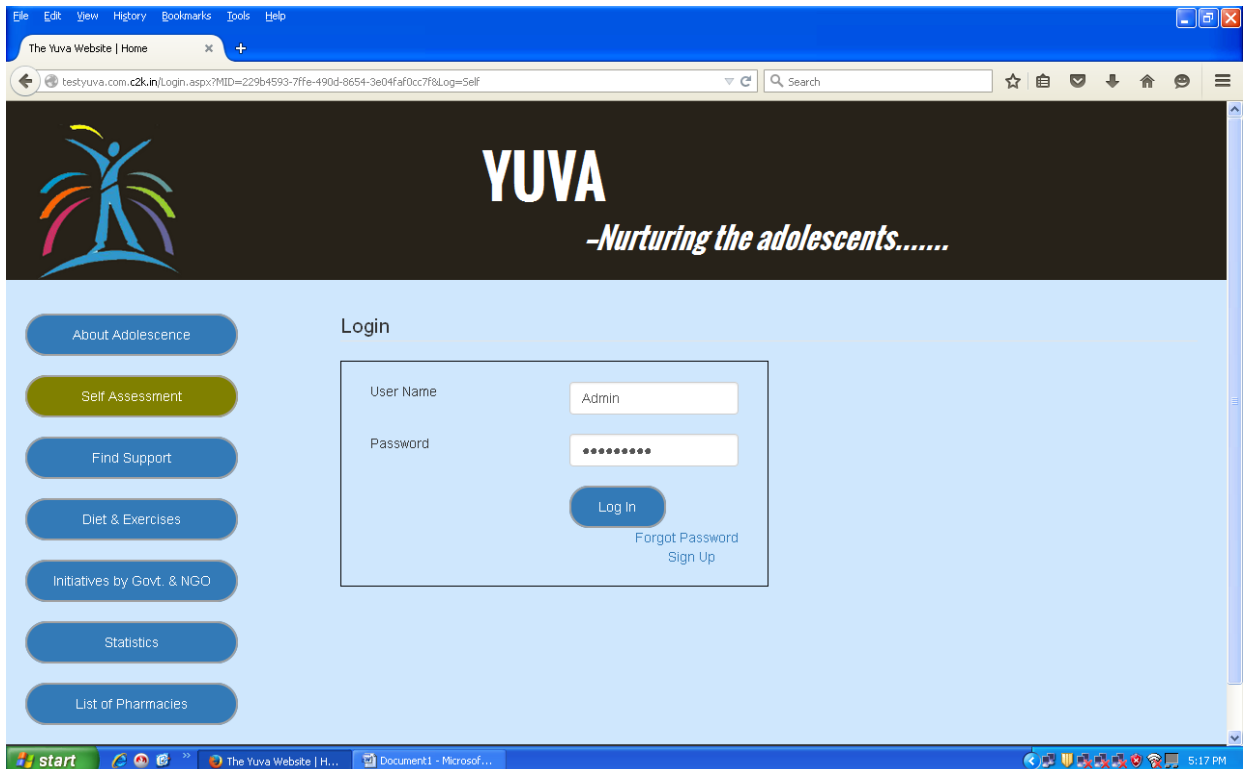Fig. 14 Viewing the link 'What is Adolescence'
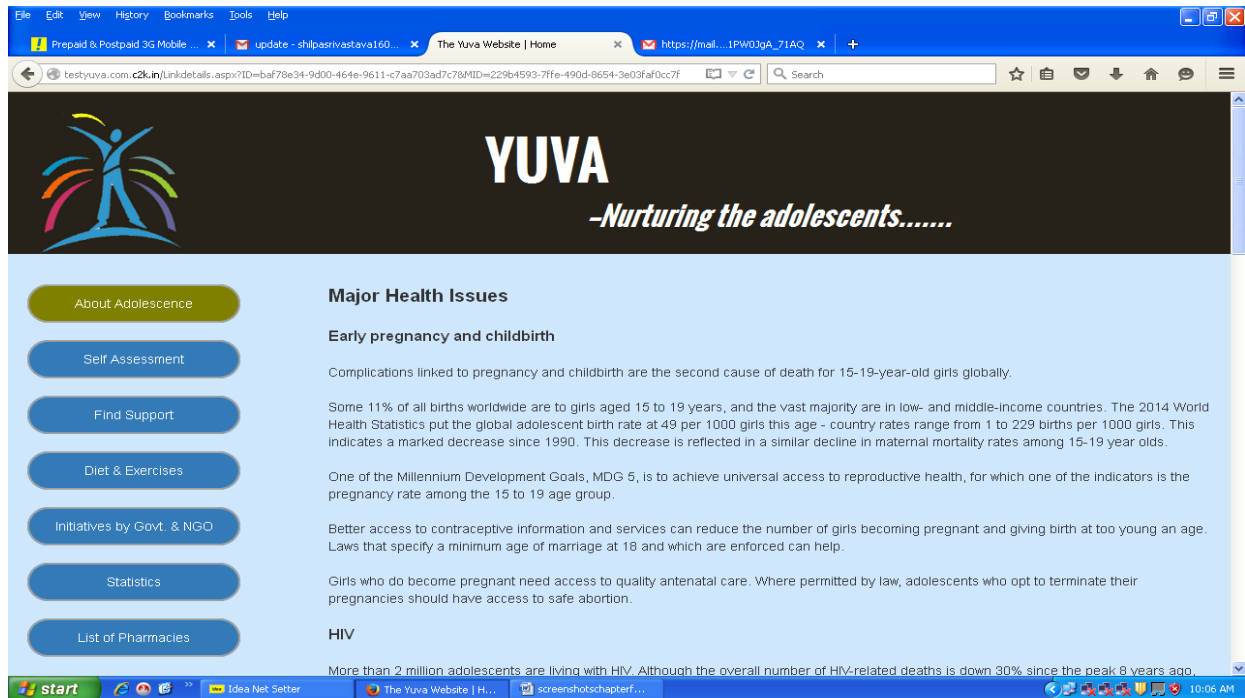

Fig. 15 Admin screen
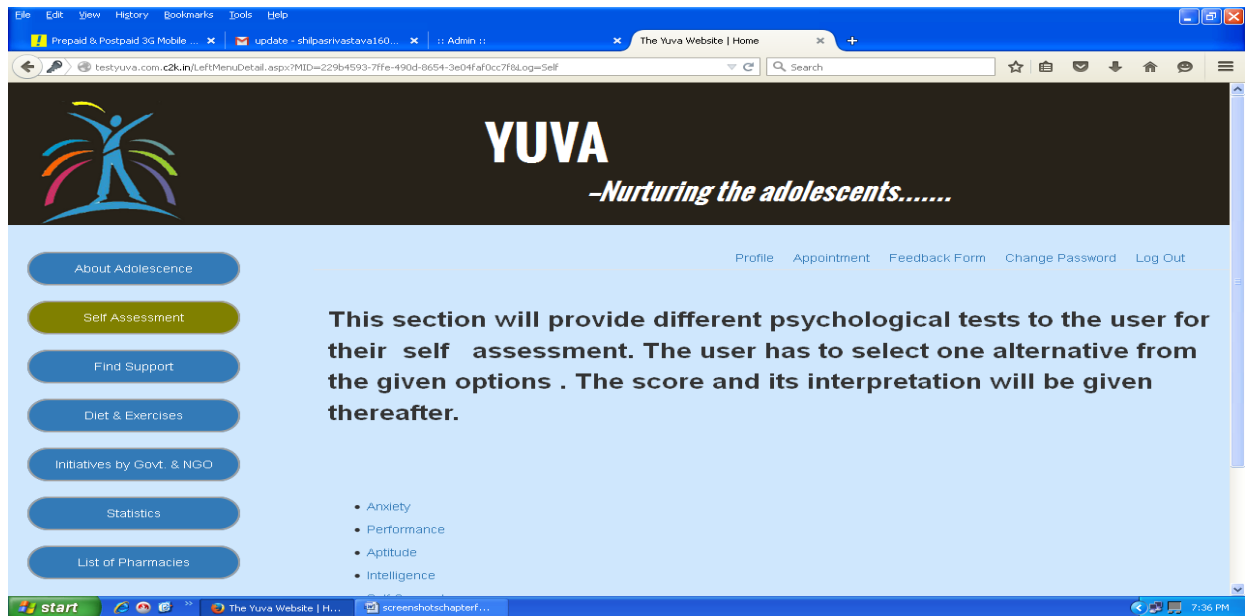
Fig. 16 Viewing the link 'Major health isuues'

Fig. 17 Viewing the link 'Self Assessment'

6. Conclusion

The study emphasizes on the usage of ICT in the psychological domain particularly for the adolescents.Present conditions of adolescents in Indian Scenario are analyzed.The Responsive Web Application 'YUVA' is designed to impart information regarding needs, problems, health issues, Govt. Initiatives etc. Besides this the user can also perform self-assessment test. Support can also be provided by linking the user to the counselor, instructor and dietician of their area. This application is implemented on .NET framework.

7.Future Scope

The work presented in this study can be extended. Based on the study and implementation few suggestions can be integrated in future work. Few of them are:

1. Online discussion forum between counsellor, dietician, instructor and the user can be integrated.
2. The process of self assessment tests can be automated with the help of soft computing techniques(Fuzzy logic, Artificial Neural Networks etc.)
3. Different other domains of psychology like sports psychology can be incorporated in this model.

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