BioINQUIRER

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CONTENT

Message from The Dean

Greetings Everyone,

It is with pleasure and pride that I write to this issue of BioINQUIRER.

Our present IIHS was started by a group of friends in 2002 under the name of The American College of Health Sciences. It has taken ten years to get here. I am the only original member who is yet actively involved in the project, and therefore, have the most emotional attachment to the institution.

Ours is a colorful history. The first government recognized private nursing venture, the first to teach entirely in English, the first to develop an internationally acceptable curriculum, the first to train for the foreign market, the first truly local campus to get international affiliations with foreign healthcare oriented universities, produce the first Sri Lankan nursing student to have international recognition and a scientific publication, the first to introduce a biotechnology course (leading to a degree) to "A" Level qualified students. There are many other "firsts" too and the publication of our own "magazine" is another first.

With ten years of history our student body has matured. It is time now for us to have a periodic publication. Academic publications add greatly to the rigor of scientific thought and its organization. Eventually it will become a measure of our success and reputation. All eventual great publications began as humble records of humble projects.

With 7 different specialties, we should have sufficient material to make our publication interesting. We need not be stiff with academia. Jokes, personal anecdotes, pictures, poetry and quotes should all find a place.

It will be a good avenue to tell the outside world about our doings. We should contribute with pride and be counted.

Sincerely,

Nihal De Silva,
MD, MPH, ACOG.
Dean IIHS.

Editorial Board

Creating an Opportunity Hungry Professionals and Students

Editorial

In this second issue of the BioINQUIRER we present to you insights into various aspects of health and services. Thus, this issue explores the global need and demand for nurses, delves into rheumatoid arthritis, a common complaint among people, explores mothers' awareness of baby care and discusses the concepts behind modern education and learning.

In addition, two of the Laboratory Technology (specializing in Biotech) students have shared experiences of their individual projects in manufacturing eco friendly products. We hope that many more students will engage in similar scientific inquiry.

We believe that these diverse topics will both challenge and inspire you while enriching your awareness on these subjects.

All students at IIHS and those in health services are encouraged to contribute to this exchange of information and ideas.

This is a platform that is ideally suited for the allied health sciences field in Sri Lanka and overseas to display, share and disseminate knowledge within their respective areas.

It is with great pleasure we announce that the IIHS inaugural research forum "Contributions to Global Health" will be held on 4th and 5th April 2013 at IIHS. This research forum will be preceded by a one day research workshop on the 3rd of April. We look forward to your participation at that event.

We hope you will enjoy reading this second issue of the BioINQUIRER.

Nurses wanted ; A global demand

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We are in an era where Sri Lanka as a country is focusing heavily on foreign employment. The section on Foreign Employment in the National Human Resources and Employment Policy (2012) states that in the year 2009, out of the 784,212 positions offered, Sri Lanka could supply persons for only 247,119 of them. It further explains the lack of skilled workers as a main reason for this. Therefore the report states, 'The focus of national policy in the foreign employment sector is aimed at "ensuring skilled, safe migration" '; as a primary policy of the government. To achieve this, the report further suggests the following; 'Promoting skilled migration through better skills training, diversification of destinations, identification of and capitalizing on Sri Lanka's competitive advantages in this field according to global employment opportunities that are available.'

Out of the many available such employment opportunities, nursing has become particularly, one with a huge demand. The Multidisciplinary Global Advisory Group of the World Health Organization (2000) in their report has acknowledged a worldwide shortage of nurses. They further emphasize the gravity of the issue by stating that the crisis situations in many countries due to this shortage have been key themes in many of their meetings. In an article on Shortage of Nurses, Booth (2002) explaining the possible reasons and extent of the problem states, 'The shortage is caused by an increased demand for nurses, while fewer people are choosing nursing as a profession and the current nurses worldwide are aging. The shortage applies to nurses in practice as well as the nurse faculty who teach students.'

The problem is recognized and prioritized by many developing countries in the world, opening opportunities for qualified nurses. Murphy (2012) reveals that by 2025, there will be an alarming shortage of nurses in Australia. Further explaining Murphy states that by 2025, there would be a predicted gap of between 80,000 and 147,000 nurses.Murphy further reveals the requirement to reveal the gap by saying 'The figures indicate that nursing graduates need to be boosted by between 85 and 158 per cent - or 8000 to 14,700 newly qualified professionals - to increase self-sufficiency and meet future demand.'The alarming shortage is further described in Health Workforce Australia's report on Doctors,Nurses and Midwives (2012) which says the shortage is highly significant in the case of nurses (109,000 or 27%), comparatively so much more than it is for doctors (2,700 or 3%).

Schofield (2007) has carried out a research on rate of retirement of nurses in Australia. The study has revealed that the rate is significantly higher between the base year of 2006 and 2026, than they were between 1986 and 2001 ($p < 0.001$). In this study the reason for this difference is mentioned as the phenomenon of 'Baby booming', meaning the high birth rate seen in Australia immediately after the second world war and then the compensatory reductions in birth rates seen in the 1970's, and 80's. Therefore once the present workforce (who are primarily post-world-war born) retire, there will not be adequate replacements for them within the Australian population. This projected lapse especially with regard to nursing is explained in Australian Bureau of Statistics report, Australian Social Trends: Nursing workers (2005). Schofield in the same study quoted before, goes to further states 'The next 20 years will see a large number of nursing vacancies due to retirement, with ageing already impacting on the structure of the nursing workforce.'

The situation is not so different in the United Kingdom. Buchan (1999) states it as 'One in five nurses on the United Kingdom (UK) professional register is aged 50 years or older. Over the next few years, the profession will lose, through retirement, many of its most experienced practitioners.' A research carried by Louise (1998 reported by BBC 2002) has identified alarming facts as 24% of registered nurses are set to retire within the next five years (from then) and 12% of district nurses are aged over 55 and eligible to retire at any time. They further report that 170,000 registered nurses have left the nurses register between 1990 and 2000. In a repeat of the article published by the BBC in 2003, quotes a nursing leader at the Royal College of Nursing who has stated 'The NHS is in a "race against time" to replace the 50,000 nurses who will retire over the next five years' (at that time). And these effects could be expected to be prevalent currently.

A similar situation prevails in the North America as well. An article on Nursing times, named 'NHS faces a nursing shortage, review for RCN warns', (Oct 2012) quotes the U.S. Bureau of Labor Statistics stating 'the projected nursing demand growth rate from 2008–2018,as reported by the U.S. Bureau of Labor Statistics is anticipated to be a 22%, or 2.12% annually.'. Therefore the demand is expected to exceed the current growth rate. Projected Supply, Demand, and Shortages of Registered Nurses: 2000-2020 (2002) report further clarifies the serious situation in USA as 'The projected shortage in 2020 results from a projected 40 percent increase in demand between 2000 and 2020 compared to a projected 6 percent growth in supply.'

A similar situation prevails in the North America as well. An article on Nursing times, named 'NHS faces a nursing shortage, review for RCN warns', (Oct 2012) quotes the U.S. Bureau of Labor Statistics stating 'the projected nursing demand growth rate from 2008–2018,as reported by the U.S. Bureau of Labor Statistics is anticipated to be a 22%, or 2.12% annually.'. Therefore the demand is expected to exceed the current growth rate. Projected Supply, Demand, and Shortages of Registered Nurses: 2000-2020 (2002) report further clarifies the serious situation in USA as 'The projected shortage in 2020 results from a projected 40 percent increase in demand between 2000 and 2020 compared to a projected 6 percent growth in supply.'

Registered nurses association of Ontario in an article named,'Briefing Note: Investing in Nursing Education' (2009) quotes The Canadian Nurses Association projecting a shortage of registered nurses in Canada of 78,000 RNs by 2011 and 113,000 RNs by 2016.

This situation has increased the salaries and other benefits in the field of nursing in order to attract more people to take up nursing as a profession. The Nursing Salary Survey 2005 in the United States show that the Salaries for nurses have constantly been in the increase. The survey states; 'The overall average annual income for all respondents is $58,600, 7.3% higher than 2004 ($54,600) and 18% higher than 2003 ($49,600). Continuing a trend over the past few years, the starting hourly base salary for RNs also rose, averaging $20.15/hour-an increase of 4.2% over last year. And LPNs gained even more, reporting a 6.2% increase over the previous year ($13.58 to $14.43/hour).'

Migration of nurses has therefore become an important factor to balance out this global crisis; thus creating a job market with an extremely high demand. In a previously mentioned article of the BBC News (2003), general secretary of the Royal College of Nursing, was quoted saying 'without an influx of international nurses in recent years the health service would be "running to standstill" '.And as illustrated by Kingma (2007) In a study on Nurses migration, many countries have increasing percentages of their nursing work forces belonging to migrant nurses. Naming some; 5-10% of nurses in USA, 21% in New Zealand, 30% in Switzerland etc.In his work Health workforce migration to Australia, Hawthorne (2012) states 'As with medicine, Australia has had a longstanding dependence on migrant nurses to compensate for chronic nurse shortages, due to the continued exodus of Australian nurses overseas and to emerging opportunities in other professions.' Hawthorne further stated '. By 2008-09, based on analysis of Department of Immigration and Citizenship (DIAC) data, Victoria was the major importer of temporary nurses (1,010 that year), followed by Queensland (780), Western Australia (750) and NSW (610).'

Therefore it can be concluded that Nursing could be one of the main skilled professions that Sri Lanka could plan to produce to meet the ever increasing demand throughout the world. And hence as the National Human Resources and Employment Policy (2012)suggests, proper training to produce skilled workers; in this case skilled nurses to match the needs of the global demand is a massive need of the hour. Hence, institutes, infrastructure and resources to provide such an up-to date and globally matched training has become more important than ever before.

References

Australian Bureau of Statistics., 2005. Australian Social Trends 2005. [online]
Available from:
http://www.who.int/hrh/nursing_midwifery/gag_sixth_report.pdf
[cited 14 January 2013].

BBC News., 2002. Nurses shortage 'threatens NHS'.[online](published 2002)
Available from:
http://news.bbc.co.uk/2/hi/health/1827487.stm
[cited 14 January 2013].

BBC News., 2003. Nurses shortage threatens NHS.[online](published 2003)
Available from:
http://news.bbc.co.uk/2/hi/health/2980707.stm
[cited 14 January 2013]

Booth, R.Z., 2002. The Nursing Shortage : A worldwide Problem
Rev. Latino-Am. Enfermagem, [online]. 10,
Available from :http://www.scielo.br/scielo.php?script=sci_arttext&pid=S0104-11692002000300013&lng=en&nrm=iso
[cited 14 January 2013].

Buchan, J.,1999.The 'greying' of the United Kingdom nursing workforce: implications for employment policy and practice.
Journal of Advanced Nursing 1999,4 (818-26),
Available from :http://www.ncbi.nlm.nih.gov/pubmed/10520093
[cited 14 January 2013].

Cheryl, L., 2005. Salary survey
Nursing 2005,35.,
Available from :http://www.biomedcentral.com/1472-6963/7/87/
[cited 14 January 2013]

Global Advisory Group on Nursing and Midwifery.,2000. Report of the sixth meeting 2000. [online]
Available from:
http://www.who.int/hrh/nursing_midwifery/gag_sixth_report.pdf
[cited 14 January 2013].

Hawthrone.L.,2012.Health workforce Migration to Australia; Policy trends and outcomes 2004-2010.
Available from :https://www.hwa.gov.au/sites/uploads/HAWTHORNE-%20HealthWorkforceMigrationFullReport30May_0.pdf
[cited 14 January 2013].

Health Workforce Australia.,2012. Doctors, Nurses and Midwives - Volume1 2012.[online]
Available from:
http://www.hwa.gov.au/sites/uploads/health-workforce-2025-volume-1.pdf

[cited 14 January 2013].

Kingma.M.,2007. Nurses on the Move: A Global Overview
Health Services Research 2007. 42 (1281-1298)
Available from :http://www.ncbi.nlm.nih.gov/pmc/articles/PMC1955376/
[cited 14 January 2013]http://www.nursingcenter.com/pdf.asp?AID=604651

Lintern, S.,NHS faces a nursing shortage, review from RCN warns. 2012.
Nursing Times, [internet].22 October
Available from:
http://www.nursingtimes.net/nhs-faces-a-nursing-shortage-review-for-rcn-warns/5050873.article
[cited 14 January 2013].

Louise, M.,1998. Nurses shortage threatens UK care
British Medical Journal (International Edition) 1998, 317 (1176),
Available from : http://www.bmj.com/content/317/7167/1176.2
[cited 14 January 2013].

Murphy, Katharine.,2012.Nursing shortage crisis looming. National Times,
28, Mar. [online]
Available from:
http://www.smh.com.au/opinion/political-news/nursing-shortage-crisis-looming-20120327-1vwl6.html
[cited 14 January 2013].

Registered Nurses Association of Ontario.,2009.Briefing Note: Investing in Nursing Education 2009.
Available from:
http://rnao.ca/policy/briefing-notes/investing-nursing-education
[cited 14 January 2013].

Schofield, D.J.,2006.Replacing the projected retiring baby boomer nursing cohort 2001-2026
BMC Health Services Research 2007, 7 (87),
Available from :http://www.biomedcentral.com/1472-6963/7/87/
[cited 14 January 2013].

Secretariat for senior ministers, Sri Lanka.,2013. National Human Resources and Employment Policy 2012. [online].
Available from:
http://www.nhrep.gov.lk/index.php?option=com_content&view=article&id=109&Itemid=59&lang=en
[cited 14 January 2013].

Slapper, Gary., 2005. Corporate manslaughter, new issues for lawyers. The Times,
3 Sep. pp.4-5.

U.S. Department of Health and Human Services.,2002.Projected Supply, Demand, and Shortages of Registered Nurses:
2000-2020, 2002.
Available from:

U.S. Department of Health and Human Services.,2002.Projected Supply, Demand, and Shortages of Registered Nurses:
2000-2020, 2002.
Available from:
ftp://ftp.hrsa.gov/migrated/.../nursing/rnsupplyanddemandreport10.doc
[cited 14 January 2013].

Study and Production of Home Made Pineapple Wine

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Introduction

The term 'wine' is applied to the production made by alcoholic fermentation of fruits or fruit juice with an aging process known as fermentation. Wine is usually named after the fruit from which they are produced. Therefore wine made with the use of Pineapple fruits is called *Pineapple wine*.

Pineapple is said to be a store house fruit because it carries many health benefits. When used for preparing wine, it produces soft, dry, fruit wine with a strong pineapple bouquet. It has mix sweet and tart taste with rich flavor. The advantage of making a variety wine depends on the variety of base ingredients being used, that we can get to experience the taste of new flavored wines.

Wine which is produced in large wine industries in large quantities preservative methods are used to keep the wine fresh. In these types of wine the chemicals such as campden tablets, acid blend and some enzymes such as pectic enzymes are used to give artificial quality and taste for wine. The consumption of it has many side effects due to the presence of chemicals.

In home made wine, the product is fresh, without any chemicals and the cost can be saved. The methodology is much simpler and is easy to make at home. An additional benefit in consuming home made wine is that the alcoholic level can be monitored and adjusted to the desirable quantity but this type of wine cannot be stored for a long period of time, thus it will lose its taste and freshness.

Procedure

The structure of methodology applied in the study examines the wine making process by the use of simple procedures as used in antient times. The advantage of the study is that the wine is chemical free sustains health while saving costs.

A weight of 1kg of pineapple, 1kg of sugar, 2 teaspoons of *Saccharomyces cerevisiae* and 10 cups of water is warmed and then allowed to cool. The process is long and it requires patience, regular monitoring is necessary. Throughout the process aseptic conditions must be followed to prevent con-

The procedure has four subdivision process, they are as follows:

1. Preparation of wine with the base ingredients
2. Primary fermentation
3. Secondary fermentation
4. Heating process

The experiment was started by preparing the content of wine. It is the most essential part of the experiment where faults could occur if not done with care. Ten cups of water was poured into the airtight container and 1kg of pineapple must be added in two forms as pulp and juice; it is made by cutting the fruit into small pieces and leaving it in the refrigerator, the juice is the natural extract from the fruit. Later 1 kg of white crystal sugar must be added. Before introducing the yeast into the content, the sugar must be stirred well and dissolved into the solution, then two teaspoons of yeast was added and was stirred constantly for another one or two minutes. This allowed uniform mixture of yeast into the solution. The must was prepared and kept closed in airtight container and stored under dry, warm place. Temperature was more suitable at room temperature (Sri Lankan climate).

Primary fermentation

During the primary fermentation the must should be aerated once in two days up to 21 days. In between the time period the pH level was checked and recorded. When opening each time the container, made sure it was air tight. The color changed and the smell aroused during this process.

After 21 days, the wine was filtered to discard the pulp and sediments. The filtration could be repeated if necessary. The pH level was recorded. The clear liquid was once again stored back into the clean air tight container to prevent oxidation and allowed for secondary fermentation its anaerobic process which converted remaining sugar into alcohol and release of carbon dioxide. The process was very slow because the quantity of brix falls down and pH level reaches to 3.5-3.3. It was stored for minimum 27 days and later the top clear layer was pipetted out into another container.

After primary fermentation

Filtration process carried out

The sediments are filtered and discarded leaving only clear wine in the container

Next, collected clear wine was heated to stop the fermentation, if not the wine would become more dry and taste unpleasant. Heating helps to kill the yeast and other microbes if present and a clear quality wine can be obtained.

When bottling, the clear wine was transferred into a sterilized bottle and crown

The bottle was labeled with pH level, the bottled date and more importantly chemical free pineapple wine. The preservation time could not be indicated because it is a natural home made wine.

Investigation on pH level changes was examined by a pH meter and recorded.

The wine is allowed for the

Table 1: *pH level measured by a pH meter*

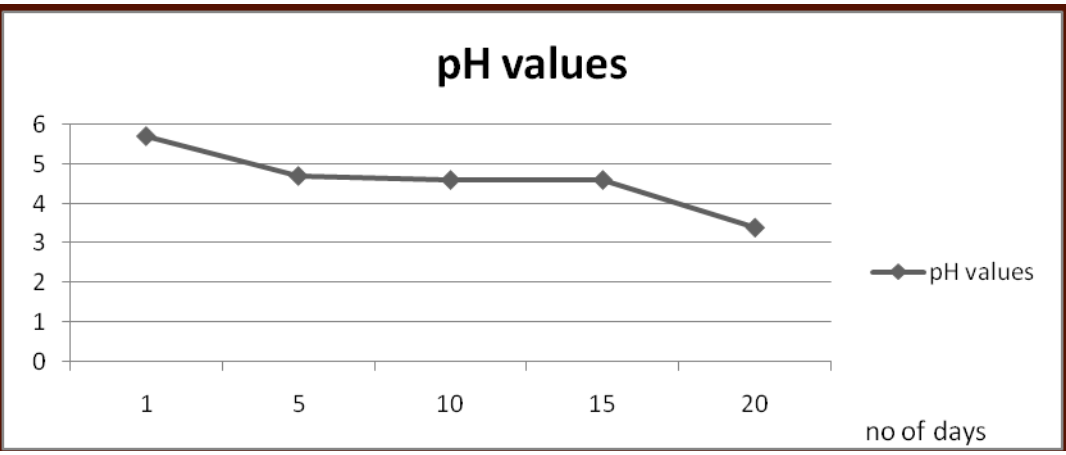
No of Days	pH values
1	5.7
5	4.7
10	4.6
15	4.6
20	3.4

According to table 1 the initial pH range of pineapple juice were found to be 5.7, it is an acidic juice because it is a citrus fruit with a mixture of sweet and savory taste. Primary fermentation is a fast process where the sugar is converted to alcohol and release carbon dioxide making the solution more acidic. On the 5th day the pH fell gradually to 4.7 and pH value 4.6 remained the same in between 10 to 15 days. Then to the end of primary fermentation it became more acid with the range of 3.4.

The acidity is measured by the amount of malic acid present in the fruits, pineapple has natural acid character gives flavor, aroma and fights the effect of spoilage organisms and also produces sulphites which will help prevent oxidization to some extent.

Temperature was maintained at a warm condition. [Sri Lankan climatic temperature was superior for wine making]. This also plays a major role in the rate of fermentation. In cool temperature the fermentation process is lowered and the quality of wine falls. Therefore, it is stored in a warm dry place with enough ventilation.

Graph 1: ***The graph illustrating the fall of pH level recorded within the 21 days.***



This clearly states that acidity levels become high at the end of the primary fermentation.

This shows a positive result because acidity enhances the flavor, and affects the survival of bacteria in the must, so using chemicals is not essential when making pineapple wine.

The change of color and odor was also examined. There was a significant change in color after 10 days time; it had a change from pineapple yellow to golden brown. At the end of 21 days there were more sediment at the bottom and a clear golden brown liquid settled on the top layer.

The odor was not taken into the account because during primary fermentation it produces unpleasant scent due to yeast metabolism interacting with fruits.

Secondary Fermentation

Secondary fermentation is anaerobic conversion of sugar into alcohol and carbon dioxide by yeast. Therefore it must not be aerated and process takes place really slowly and while in a cool place, warm conditions are not suitable during this stage. Fermentation takes at least two and half weeks. Since it is kept under anaerobic conditions pH and brix cannot be checked regularly as it would affect the process but a few readings can be taken while minimizig exposure to oxygen.

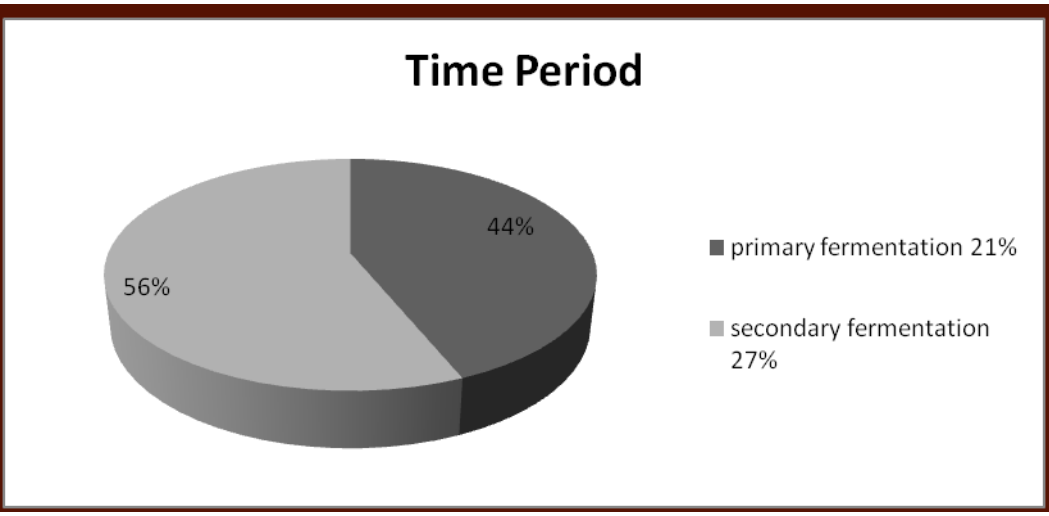
There are some problems that arise during the process. Secondary fermentation is otherwise known as Malolactic Fermentation. Malolactic conversion can take place at any time during or after alcoholic fermentation. Wine undergoing malolactic conversion will be cloudy due to the presence of bacteria, and may have the curious smell of buttered popcorn, due to the production of diacetyl.

Pasteurizing

Pasteurizing wine prevents Malolactic Fermentation and deactivates yeast function and kills other microbes in the wine.

Pasteurizing wine by high heat supplied not directly by the use of under water bath and not exceeding 70 degrees long enough to kill active yeast to stop the fermentation without adding any chemicals.

The pie chart demonstrates the extension period for making home made wine.



It only has two major processes; both processes require long time but primary fermentation takes 21 days maximum and occurs at faster rate by occupying less time when compared to secondary fermentation which is usually slow and takes 27 days or more depending on the fruit variety, more time is necessary.

Conclusions

The present study had a successful methodology because the pineapple wine results showed positive results by no spoilage or flaw detected during the fermentation stages. It proves that making home made pineapple wine is suitable without the use of chemicals but still further clarification is necessary to omit risk and errors.

The limitations are that only the physical appearance and pH value was probed in this study.

The quality can be further examined by measuring degrees of brix [specific gravity of sugar content] using hydrometer and the total acidity [TA] which is done by titrating acid wine with an alkaline, to find the concentration of acidity.

To avoid malolatic fermentation, lysozyme enzymes which is isolated from white egg can be added this protects wine to fighting against the lactic acid bacteria's and it does not interfere with yeast function.

The preservation must also be checked as a further study, this is essential for wine making because wine is the production of alcohol by fruit which is a source of preserved good.

References

http://www.ehow.com/how_5869876_heat-wine-kill-yeast.html 11/08/2012

Department of Agriculture, S. L. (2006). Department of Agriculture, goverment of srilanka. Retrieved 08 11, 2012, from http://www.agridept.gov.lk/index.php/en/crop-recommendations/1100

Depot., W. (2012). wine makers. Retrieved 08 11, 2012, from http://www.winemakersdepot.com/Tutorial-on-Wine-Making-Lesson-4-of-6-W94.aspx

T. Patterson, W. M. (n.d.). essen estate winery coop. Retrieved 08 11, 2012, from http://www.eewinerycoop.com/education/secondary.shtml

Producing Citronella Scented Candles

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Most viral fevers have become a vast problem presently. Some of these diseases are being spread by mosquitoes. Dengue and Yellow fever are some examples for the viral diseases that are being spread by mosquitoes. Besides these viral diseases there are a variety of diseases that are being spread by mosquitoes such as Elephantiasis, Malaria and etc. Among the previously mentioned diseases Dengue has become a severe problem currently in Sri Lanka.

Most of these diseases and problems can be avoided by taking precautions against the mosquitoes and generally, insects. Therefore the objective of this study is to use Citronella oil as a precaution method and to introduce Citronella oil to the public as a less inconvenient product against the mosquitoes and most of the insects.

Biopesticide are biochemical pesticides that control pests using nontoxic methods. They are emanated from naturally occurring substances. Normally conventional pesticides are synthetic substances that directly kill or inactivate pests. But biopesticides are eco friendly substances that are easy to use.

Biopesticides are mostly consisted of alkaloids, terpenoids, phenolics and some other minor chemicals. Biopesticides are derived from neutral sources as animals, plants, bacteria and certain minerals. By the end of the year 2001 there were 195 registered biopesticides in effect and 780 products that originated from them. In this case biotechnology and genetic engineering plays a major role when producing constructive biopesticides.

Citronella is a volatile essential oil that can be obtained using the leaves and the stems of different Cymbopogon (lemon grass) species. The main species that are being used are:

- Ceylon citronella oil which is being acquired from *Cymbopogon nardus Rendle*

-and-

- Java citronella oil which is being obtained from *Cymbopogon winterianus Jowitt*

Main constituents of Citronella oil are citronellal and geraniol. Citronella oil is colourless or light yellow liquid which has a lemony or a grassy odour. This is a flammable liquid which in case inhaled would cause an initial stimulation which would be followed by depression of the central nervous system. And Citronella oil could be harmful if ingested in a considerable quantity and might also cause irritation or allergic reaction for some individuals if it gets in contact with either eyes or skin. However generally, if used in a correct method, Citronella oil is not considered as a hazardous substance for humans. And it also has a low or no risk to the environment or to the wildlife considering Citronella oil is both natural and has a low level of toxicity. And it is not very largely in use to cause any adverse effects.

Currently Citronella oil is being produced in industrial scale throughout the world. Some of the main countries that are involved in manufacturing Citronella are Taiwan, Sri Lanka, Brazil, Mexico, South Africa, Argentina, Jamaica, Ecuador, India, Honduras, Guatemala and Madagascar.

Citronella oil has many uses of it. Following are some of the major applications of Citronella oil.

- Insect repellent – One of the most important uses of Citronella oil is that it acts as an avid insect repellent. It repels insects as mosquitoes including Aedis aegypti (Dengue causing mosquito), fleas, black flies and ticks which aid to prevent their bites. It can be used on human skin and the clothing as a liquid, oil or a patch. Citronella oil is more preferred rather than synthetic repellents as DEET because Citronella oil is a natural, non toxic substance which can be safely used as a repellent. Citronella oil can also be used as a repellent for animal either to ward off fleas and ticks.

- Aromatherapy – Citronella oil holds activating and warming qualities, both physically and mentally. Use of Citronella oil in aromatherapy is sometimes overlooked as it is mostly used for its insect repellence quality. However when Citronella oil is diluted in a base oil and applied to the skin would formulate a mild warm sensation relieving painful muscle and joints. Even though this has not been proved with instructive scientific experiments, the aroma of Citronella helps to sooth nervous fatigue. And this also aids in relieving the pressure of migraines and headaches.

- Astringent – Citronella oil can also be used as an astringent for oily skin areas. As a precaution a single drop of Citronella oil can be applied to the inner forearm to test for irritation. Then two to three drops of Citronella oil can be applied on oily skin areas to wipe off the excess oil using cotton balls.

- Perfume industry – Mostly Java citronella oil is used to produce perfumes as they carry a stronger aroma than the Ceylon Citronella oil. Citronellal and geraniol are major components in perfumes.

Producing Citronella Scented Candles

- Necessary amount of oil should be poured into a heat resistance beaker and it should be heated using a Bunsen burner. The heating should be stopped right after the wax is liquefied. Then the appropriate amount of previously distilled Citronella oil should be added into the liquid wax. A small amount of dye can be added to give a colour to the candle. The liquid mixture should be then poured into the mould with the prepared wick.

- The amount of wax that should be used depends on the mould. For a cylindrical mould with diameter of 4 centimetres and the height of 6 centimetres, 200 grams of wax was used. The paraffin wax was placed inside a heat resistant beaker and was heated until it is liquefied using a Bunsen burner.

Then 10 millilitres of Citronella oil was added into the liquid paraffin wax. Then 2 grams of dye was added into the liquid wax mixture to give out a colour.

While the wax was melting a 7 centimetres long piece of twin thread, soaked and then hardened with paraffin wax was tied to a piece of tooth pick to be used as the wick of the candle. This was placed in the mould. (The wick did not collapse as the tooth pick was stuck at the mouth of the mould.)

Then the liquefied wax mixture was poured into the mould and left to solidify. Finally after the candle was set the toothpick was removed carefully.

Citronella oil targets various specific bothersome insects including mosquitoes, flies, fleas and ticks. Citronella works without harming or killing the insects. It has a unique odour that makes it difficult for some pests to locate the host. It acts as a smoke screen blocking the scent of the host. Pests avoid this not because they dislike the smell but because it makes them hard to find a host. Another effect of Citronella on pests is that the chemical composition in the oil irritates the feet of the pests. This averts the insects from landing on a person who has applied Citronella oil or has a burning Citronella candle. And also the terpenes in the oil are said to block neural pathways in the pests such as mosquitoes and interfere with their metabolism and their movements without killing the insect. The length of the time which gives the repelling effect varies with the amount of Citronella oil in the candles and how long the odour exists.

Citronella oil also holds some therapeutic properties also. They are mainly antiseptic, deodorant, diaphoretic, tonic and stimulant. It also has an admirable effect of clearing the mind. When the candles are lit it releases a faint and continuous stream of oily vapours with lemony and herbal fragrance to the environment. These vapours enter into the respiratory system and eventually absorbed into the bloodstream, thus preventing and treating certain illnesses. And these aromas stimulate the brain calming and soothing the person. It is also said that the aroma of Citronella can aid in easing the headaches and migraines.

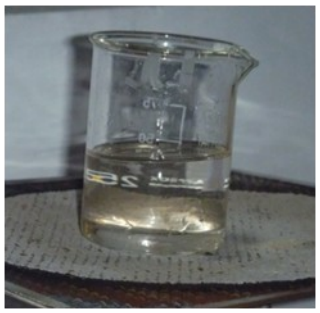
It also gives a beauty to the surrounding creating a very ambient environment. Furthermore Citronella oil does not have any adverse effects on both the humans and the environment.

And the Citronella scent induced candles can be produced in a larger scale to be used around the mosquito-rich areas to avoid them. Moreover pure Citronella oil should be used to achieve better results.

Another improvement can be done to raise the quantity and the quality of the Citronella oil. According to the initial plan the citrus plant materials are to be placed in the water and boiled. Instead of this method double boiler method can be used. When using the double boiler method, a container with water is placed under the strainer-like container with citrus leaves. A smaller glass container can be positioned in the middle of the strainer-like container. And an upside down stainless steel lid can be used as a condenser with ice on the top. The lid should fit with the container below. Then the apparatus can be sited on the heat source. Upon heating the water vapours would carry the oil molecules and when then come in contact with the cold (due to ice) stainless steel lid, the vapours would cool down and drip in the smaller glass container in the middle. During this method more oil can be extracted and it the more pure.

Solid paraffin wax

Melting



Liquid paraffin wax + Citronella oil

Adding the dye

Pouring the mixture to the mould

The candle

Solidification

The final product

Finished products:

MOTHERS' KNOWLEDGE REGARDING NEONATAL BABY CARE

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Introduction

Neonatal deaths have been estimated to be approximately 4 million annually in the world Parul, 2007) while the infant mortality rate per 1000 live births (Annual Sri Lanka Neonates are at risk for death due to various health problems, even though they have been born with average birth weights, thus ,the morbidity and mortality rates in newborn infants are higher.

Providing optimal care will greatly improve the survival of infants (Parul, 2007) . Most neonatal deaths can be prevented by taking measures such as clean delivery, prompt resuscitation, infection control, thermal protection and breast feeding. Thus the improvements in the survival of newborn is dependent on health care provided (Gupta *et al.,* 2010) . Death during the neonatal period (the first 28 days of life) accounts for almost two-thirds of all deaths in the first year of life and 40% of deaths before the age of five
(Parlato *et al.*, 2005).

Therefore, the aim of this study was to determine the knowledge of mothers, who were admitted to the postnatal ward of Teaching Hospital Kurunegala regarding the neonatal baby care.

Methodology

This research was performed as a descriptive and was carried out in the Teaching Hospital, Kurunegala. Every mother who was admitted to the postnatal ward during the given period of time was included in the population.

An interviewer administered questionnaires were used as the research tool Mothers were classified to five categories according to the knowledge level
The variables studied were parity, age, educational level and occupation. Data collection was carried out in the period between th of April and nd of May 2011. Every mother admitted to the postnatal ward, was selected until n=246 was obtained.

The gathered data was analyzed by using SPSS (version 13.0)

Results

The mean age of the sample was 26 years with the age ranging from 15 years to 45 years. Nearly half of the mothers (48.4%) had completed education up to O/L. The percentage of mothers who had completed education up to to higher education was 41.3%. A considerable proportion of mothers(86%) were unemployed . Approximately half of mothers had one child. The percentage of postnatal mothers, who had two children, was Others had more than two children.
Level of education was found to be positively and significantly associated with the knowledge regarding neonatal care. In addition, occupation and age also were found to be significantly associated with the knowledge level.

As expected, parity did not show a significant association with the maternal knowledge regarding neonatal care.

Table 1

Knowledge On Breast Feeding		
Category	**Frequency**	**Percentage (%)**
Very Poor	2	0.81
Poor	19	7.72
Average	48	19.53
Good	116	47.15
Very Good	60	24.39
Total	245	99.6
Unclassified	1	0.4
Total	246	100.0

Table 2

Knowledge On Umbilical Cord		
Category	**Frequency**	**Percentage**
Very	33	13.44
Poor	92	37.39
Average	90	36.58
Good	30	12.19
Very	0	0
Total	245	99.6
Unclassi-	1	0.4
Total	246	100.0

Table 3

Knowledge On Neonatal Hypothermia		
Category	**Frequency**	**Percentage**
Very Poor	104	42.27
Poor	112	45.52
Average	24	9.75
Good	5	2.03
Very Good	0	0
Total	245	99.6
Unclassified	1	0.4
Total	246	100.0

Association between the Knowledge with selected Socio – Demographic variables

Considered Socio Demographic Factor	"P" Value	Significant Association
Age with the Knowledge	P = 0.045	**P**
Educational Level with the Knowledge	P = 0.000	**P**
Parity with the Knowledge	P = 0.258	**X**
Occupation with the Knowledge	P = 0.000	**P**

✓	There is a significant association
X	There is no significant association

The results showed that mothers' knowledge and practices regarding breast feeding was at a satisfactory level in the considered population. But knowledge of mothers regarding umbilical cord care was not at a satisfactory level. More than half of them had less than average knowledge level. It was also found that mothers' knowledge of prevention of neonatal hypothermia was poor. With regard to this, a large proportion of them were in the poor knowledge group (45.52%) and very poor knowledge group (42.27%).

The results clearly showed that prevention of neonatal hypothermia was the most deficient factor in mothers' knowledge. Maternal knowledge of breastfeeding was the only satisfactory knowledge field.

Discussion

The present study showed that a fair number of mothers was in a satisfactory knowledge level group regarding breast feeding practices. It was found (Gupta *et al*, 2010) that more than one-third (43.5%) of mothers gave the colostrum to their babies. Out of those who did not give colostrum, 66.9% did not give it. More than one-third (36.6%) of the mothers initiated breastfeeding within 1hour of birth and 30.2% initiated after 1st day. There were 33.2% mothers who initiated within 1-24 hours.

A study conducted in Haryana, India revealed that 75% of newborns were given pre lacteal feeds of honey, tea and diluted milk, and babies were often not breastfed during the first 3 days and colostrum was discarded (Bhandari *et al* , 2003) . And this is not comparable to the results of the present study.

According to the results of the present study, it is clearly shown that more than half of the mothers (50.83%) did not have a satisfactory knowledge level regarding neonatal umbilical cord care. None of them had a very good knowledge level, however, a considerable proportion (36.58%) had an average and (12.19%) of them had a good knowledge.

A study conducted in Bangladesh (Moran *et al.*, 2009) yielded, effective cord care (46%). An extensive care was given to the umbilical cord including massage and/or applying substances. Above results can be compared with the results of the mothers' knowledge regarding neonatal umbilical cord care.

In this study, it was found that maternal knowledge regarding neonatal hypothermia was at a very poor level. Only a small proportion of them knew how to protect their babies from hypothermia (2.03%). None had a very good knowledge regarding neonatal hypothermia. Similarly,(Gupta *et al.*, 2010) the majority of the newborns (79.7%) were washed with warm water and dried up with a clean cloth immediately after birth, while 18.1% of newborns were not given a bath and only dried up with a clean cloth. It was clearly shown that there were different socio-demographic variations within selected sample population.

Tulbar *et al*., (2010) have examined that good new born care practices were associated with the higher level of education and maturity of age. Which is comparable to the results of the present study.

Baqui *et al.*,(2006) have examined significant associations between newborn care practices, and socio-demographic factors and, it was found that neonatal care practices were related to educational level, age and occupation, which is also comparable to the results of the present study.

Conclusion

Majority of the mothers had a satisfactory knowledge on correct breast feeding practices. Poor knowledge and practices were associated with younger, lower educated and unemployed mothers. Maternal knowledge about neonatal umbilical cord care and protecting baby from hypothermia were at a poor level. Prevention of neonatal hypothermia showed the least awareness among mothers in comparison to the other two.

It is recommended that expectant mothers be educated regarding the aspects of neonatal care discussed in the present study, in addition to breast feeding.

References

Annual Health Bulletin Sri Lanka (2003 Ministry of Health, Sri Lanka.

Baqui, A. H., Williams, E. K., Dramstadt, G. L., Kumar, V., Kiran, T. U., Panwar, D. et al (2006). Newborn care in rural Uttar Pradesh. Indian J Pediatr. 74 :3; 241-247.

Gupta,P.,Srivastava, V.K, Kumar, V.,Jain, S. ,Masood, J., Ahmad, N. & Srivastava, J,P. (2010). Newborn Care Practices in Urban Slums of Lucknow City, UP. 35:1; 82–85.

Moran, A.C., Choudhury, N., Uz, Zaman, Khan, N., Ahsan, Karar, Z., Wahed, T., Faiz, Rashid, S., Alam, M.A. (2009). Newborn care practices among slum dwellers in Dhaka, Bangladesh,17; 9-54.

Parul, D .(2007). Pediatric Nursing , (1st ed) .Vol. 01, Pp.51-100.In: Medical publisher(P)LTD, NewDelhi, India.

Introduction to Modern education and learning

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In the changing world today, education plays a major role in the development of society as a whole. It is useful to look at education and how best we could use various methods of learning. Education, learning, training are some words we frequently encounter in the education field and let's look at these descriptively .

Education education is the formal process by which society deliberately transmits its accumulated knowledge, skills, customs and values from one generation to another, for example instruction in schools. Education is the big picture of all educational processes and different countries would use different educational methods depending on their cultural, social, legislative and religious norms.

Learning is acquiring new, or modifying existing, knowledge, behaviors, skills, values, or preferences and may involve synthesizing different types of information. The ability to learn is possessed by humans, animals and some machines. The length of the learning is called as learning curve, it is life time learning and each day we build on what we already know. Therefore, it is a process rather than a collection of factual and procedural knowledge.

Training is the **acquisition** of knowledge, skills, and competencies as a result of the teaching of vocational or practical skills and knowledge that relate to specific useful competencies. Training has specific goals of improving one's capability, capacity, and performance. The training is primarily basic training required for a trade, occupation or profession and it is the core of apprenticeships and provides the backbone of content at institutes. Therefore, initial training we receive at nursing schools, engineering universities , hotel schools etc. lead to a specific job. After this training the trainee is qualified to obtain a specific job ,such as nursing, engineering or as a hotelier . The next stage of training is the **professional development** , where once they are in the job the employer will train the employee to upgrade his capacity and aptitude by placing him or her in development programme, so the organization is transforming the person to undertake responsibilities in the next level in the organization .

The teacher and the learner: The person who is giving information is called the teacher, resource person, lecturer or the trainer and the person who is receiving information is named the student, pupil learner or the trainee.

The educating, training and learning is a well balanced two way system where, the input or the information given by the teacher should be absorbed by the pupil and it should be checked by the teacher by performing a process called assessment. This is the feedback obtained from students at the examinations and practical testing.

Outcomes of teaching: In modern teaching there are six recognized categories of information given to pupils. these include ; Knowledge - "what to do" ; the Skill - "how to do" ; the Attitude "- want to do " ; the Aptitude – " how to progress to the next step" , Values – " what is good spiritually , socially , morally and ethically "; Environment stewardship – " how to protect the environment for the present and future generations".

The teachers, trainers, lecturers are performed wide range of duties, to promote learning in their pupils and it is important to look at the recognized roles of the teachers. These include , identifying the needs of the industry ; **assessing** learner profile (what their pupils know, understand and can do) ; identifying the needs gap – industry need and the students profile ; then plan most effective training and assessment strategies : delivering the training/ education through the most effective learning methods ; organize clear roles expected by the teachers and the students as well ; Creating a positive learning environment leading to high expectations for all their pupils, of whatever class, race, gender or ability.

There are two methods of measurement of the outcomes of educational / training programmes ; namely by analyzing the success rate in programme completion and the job outcomes. Therefore, firstly Identifying the needs of the industry (need gap/ demand for professional) is an important task to prepare the student for job out comes. Furthermore, the successful completion of the programme depends on how the programme is designed to suite the candidates and it is utmost important to analyze the level of education, language / IT skills and this process can be identified as organizing a learner profile. Thirdly, programmes should be planned in order to fulfill the above mentioned criterion through a process of Training and Assessment Strategies (TAS). In this phase ,the training plan is organized with special emphasis on cost effective delivery of the programme whilst includ all the participants of the programme , irrespective of their learning disabilities and other obstacles to learning weaknesses , leading to the fulfillment of recognized concepts in education such as 'Inclusivity ', 'Accessibility' , 'efficiency' , 'effectiveness' and lastly 'sustainability' . The assessment methodologies are also designed based on the learner profile.

Rheumatoid Arthritis

Physical Therapy management of rheumatoid arthritis

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Introduction

Rheumatoid Arthritis (RA) is the most common form of inflammatory arthritis which was described in detail for the first time at the end of the 18th century. This systemic disease affects all ethnic groups with the peak incidence in the fifth and sixth decades of life. It is characterized by proliferating and destructive changes in the synovial membrane, periarticular structures, skeletal muscles and perineural sheaths of the host. Eventually, the affected joints become fibrosed or ankylosed because of destructive changes in the joint structure [1].

Epidemiology

The prevalence of the RA is approximately 1% in the general population in the United States. Prevalence is similar worldwide. It affects all ethnic groups with the peak incidence in women between the ages of 30 and 50. Disorder occurs three times more frequently in women than in men). Considering the significance and impact of RA is vitally important, because it is a progressive destructive disease which leads to bone deformity, joint destruction and permanent disability of the affected joints [2, 3].

Pathophysiology

Even though the exact cause is still unknown, researchers have found the disease is caused by auto-antibodies which affect synovial tissue. Most of the cases (70% to 90%) are caused by the Rheumatoid Factor (an autoantibody) coupling with IgG, itself an antibody. Most of the remainder is caused by the rheumatoid factors attaching to IgM, IgA or IgE. This immune complexes, which is a measure of these rheumatoid factors, are engulfed by WBCs and elaborate destructive lysozymes within the lysosomes.

Procollagenase, an enzyme released by neutrophils, is converted into active collagenase by the synovial fluid. Collagenase then splits the collagen of the articular surface cartilage and leads to primary synovitis. This primary synovitis gives rise to a pannus which in turn forms villi. These villi migrate toward the joint causing its destruction and ankylosis [1, 4]. In addition, some researchers say the disease is influenced by genetic, environmental, infectious factors, and autoimmunity [3].

"Physical fitness is the first requisite of happiness. Our interpretation of physical fitness is the attainment and maintenance of a uniformly developed body with a sound mind fully capable of naturally, easily, and satisfactorily performing our many and varied daily tasks with spontaneous zest and pleasure"

- Joseph Pilates

Diagnosis

The correct diagnosis is the key to the planning of treatment at any stage of a disease. Diagnosis of RA is suspected mainly by observing, morning joint stiffness, redness and swelling of the joints of more than 6 weeks duration affecting the small joints of the hands and feet symmetrically, synovial swelling and hypertrophy with an infiltrate of various inflammatory cells including lymphocytes and macrophages. Presence of serum rheumatoid factor, radiological features of RA and periarticular osteoporosis are the characteristic features of the disease, apart from other features such as fever, fatigue, weight loss, vasculitis and rheumatoid nodules. keratoconjunctivitis, dry eyes, and dry mouth, are extra articular and systemic features of RA. Confirmation of the diagnosis is done by blood tests, joint aspiration and radiologic imaging [1, 2].

Orthopedic deformities of Rheumatoid Arthritis

Rheumatoid Arthritis can affect any joint in the body. But it involves the peripheral joints more often and very rarely affects the larger joints.

Deformities in the hand

Symmetrical peripheral swelling of phalangeal and interphalangeal joints.

Ulnar deviation of the hand is due to rupture of the collateral ligaments at the metacarpophalangeal joints. This leads to slipping of the extensor tendons from their grooves towards the ulnar side.

Boutonniere's (button hole) deformity is due to the rupture of central expansion of the fingers resulting in flexion at the proximal interphalangeal joints.

Swan neck deformity is due to the rupture or stretching of the volar plate of the proximal interphalangeal joints which enables the tendons to slip towards the dorsal side. Here there is hyperextension of the PIP joint and flexion of the distal interphalangeal joints.

Trigger fingers and the trigger thumb are the nodules over the tendons.

Deformities in the foot

RA affects the whole foot which consists of forefoot mid foot and hind foot. If it is in the fore foot patients may develop, hallux valgus deformity of the great toe, claw toes, callosity over the dorsum of the foot and the sole, widening of the fore foot and the heel may show valgus deformity.

Deformities of the other joints

In the knee, patient may develop fibrous ankylosis or bony ankylosis due to widespread destruction of the articular cartilage by the pannus tissue. And also causes the followings such as flexion and valgus deformity of the knee.

Management

Pharmacological management

Under pharmacological management, Analgesics NSAIDs and DMARDs are the main drug categories that are prescribing for the purpose of reducing the progression of the disease and the symptoms such as inflammation, swelling and pain. Usually Azathioprine, Cyclophospamide, Ciclosporin, Hydroxychloroquine, Leflunomide, Methotrexate, Penicillamine, Sulfasalazine are the major drugs used for the management of RA [3, 4].

Physiotherapeutic and rehabilitative management in Rheumatoid Arthri-

The main purpose of physical therapy management for RA is to achieve pain relief and prevent joint damage and the functional loss. Physiotherapeutic and rehabilitative applications have significantly augmented medical therapy by reducing the handicaps in daily living for patients with RA.

The basic physiotherapy plan of care for the patients who have RA include educating the patient, relieving pain and muscle guarding, promotion of relaxation, minimizing of joint stiffness, maintaining available motion, minimizing muscle atrophy, and preventing deformity by protecting joint structures.

Inform the patient on importance of rest, joint protection, energy conservation, and performance of range of motion (ROM) are the initiative steps of the patient education. Additionally, teaching home exercise program and activity modification that conserve energy and minimize stress to vulnerable joints will reduce the progression of the disease.

Application of physiotherapy modalities and interventions include cold / heat applications, electrical stimulations, gentle massage, immobilization in splint, relaxation technique and hydrotherapy are the treatment techniques which are used to relieve pain, muscle guarding and to promote relaxation. Even though there are several physiotherapy agents that are commonly used in daily practice, most often their use is based on the personal experiences of the physiotherapist [5].

Cold is one of the most commonly used physical agents in various types of arthritic conditions especially during the acute stage. Applications of cold packs, Ice, cold air are some of the different methods of applying cold therapy.

According to the pathology of RA, the enzymes (cartilage - destroying enzymes) such as collagenase, elastaase, hyaluronidase and protease which cause destruction of the joint structure are affected by the temperature of local joints. The normal intra-articular temperature is 33 ^{0}C, but it may be rise up to 36 ^{0}C in a patient with RA. With temperature of 30 ^{0}C or lower, effects of these enzymes are negligibly small.

Cold affects the circulation of the local joints and causes vasoconstriction which reduces the blood supply to the joint. Reduced pressure inside the blood vessels results in low fluid exudation which reduces swelling and pain.

Application of hot packs is effective for the chronic arthritic pain. Vasodilatation occurs with the heat and delivers extra blood in to the damaged tissues. Increased oxygen and nutrients supply to the damaged tissues facilitate tissue repairing. Heat therapy can be applied as hot packs, dry hot towels, and as well as moist heat (steam).

Transcutaneous Electrical Nerve Stimulation (TENS), form of electrical stimulation is used to reduce pain perception. According to the pain gate theory, the electrical impulses travel through the sensory A-delta fibers which has connections with substantia gelatinosa, elicit a negative response at T cells. Perception of pain diminishes due to closing of the pain gate by negative response of the T cells. Application of electrodes over where the pain is most intense is beneficial to reduce the pain perception.

Passive or active assistive ROM within absolute limits of pain and gradual progression as tolerated are required to minimize joint stiffness and maintain available motion. Gentle grade I and II joint distraction and oscillation techniques are used to inhibit pain and minimize fluid stasis. In fact these techniques reduce the swelling significantly.

Maintaining of normal muscular strength and preventing of muscle atrophy are essential for the patient to become independent in activities of daily living (ADL's). Gentle isometric exercises in pain free positions and progression as tolerated minimize muscle atrophy caused due to inadequate muscle work. In the meantime, use of supportive and assistive equipment for all pathologically active joints, good bed positioning while resting, and avoidance of activities that stress the joints must be practiced to prevent progressive joint deformity.

The ultimate goal of physiotherapy plan of care for the patients with RA is to make them independent in their ADLs. However, there are some contraindications and precautions that physiotherapist should consider before the administration of any PT intervention to patients. Joint distraction, oscillation technique, stretching and passive ROM should be done with the extreme care of pain and tissue damage. Also application of heavy resistance over affected joints and vigorous stretching are contraindicated especially when joints are swollen.

The idea of the text was to give an overall description about RA and its management strategies related to physiotherapy. However, planning treatment sessions and determine necessary interventions are the duties of the therapist and also it depends on patients disease status. This is far beyond the scope of this text.

Reference

1. *Ebnezar, J. (2003). Essentials of Orthopedics for Physiotherapy : Rheumatic Diseases. Jaypee Brothers medical Publishers (P) Ltd.*

2. *Mitchell, R. N., Kumar, V., Abbas, A. K., Fausto, N. (2006) Pathologic Basis of Disease international edition (7th ed.). Elsevier Inc.*

3. *Duckworth, A. D., Porter, D. E., Ralston, S. H. (2009). Orthopedics trauma and rheumatology: Rheumatology. Elsevier limited*

4. *British National Formulary. (2009). Rheumatoid Arthritis and other Inflammatory Disorders (BMJ Group Tavistock Square, London WC1H 9JP, UK and RPS Publishing) 1. Lambeth, High Street, London. SE1 7JN, UK*

5. *Kisner, C., Colby, L. A. (2007). Theraputic Exercise: Rheumatoid Arthritis. (5th ed.). F.A. Davis company, 1915 Arch Street, Philadelphia, PA 19103.*

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